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Bringing Order Out of Chaos: An Examination of Continuity and Discontinuity in Young Children's Experiences of Household and Classroom Chaos during Early Childhood

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Bringing Order Out of Chaos: An Examination of Continuity and Discontinuity in Young Children's Experiences of Household and Classroom Chaos during Early Childhood

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Dedication

To my parents, who have always been and continue to be my greatest cheerleaders and whose unyielding love and support have been my life's greatest blessings. And to my grandparents, who truly, are my heroes.

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Bringing Order out of Chaos: An Examination of Continuity and Discontinuity in Young Children's Experiences of Household and Classroom Chaos during Early Childhood

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Early childhood—a period of development that research has established as a critical period for establishing a foundation to support later development and well-being—is increasingly likely to take place in multiple contexts. Continuity and discontinuity in children's exposure to environmental chaos across two important contexts for their early development: (1) the home and (2) the early learning and care (ELC) setting were examined using data from a large representative sample of low-income preschool children attending Head Start in order to determine *how* children's exposure to chaos in each context combine to either promote or interfere with their social-emotional and cognitive development over a year of preschool. A series of multi-level models tested whether children's experiences of chaos, operationalized in three ways: (1) as individual indicators of crowding, lack of routines, and instability in each setting; (2) as a cumulative index of chaos in each setting; and (3) as a profile that incorporated children's experiences across setting, influenced children's social-emotional and cognitive development. Both household and classroom chaos predicted children's

development, but children's experiences in their home environments were the predominant influence, indicating that children who had non-chaotic home environments gained more over the preschool year than did children who had chaotic homes. These findings provide additional support that effective and high-quality early education and care settings must incorporate children's home and family experiences.

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Chapter I: Statement of Purpose

Children's early development is influenced by each of the environmental contexts in which they take part and the developmental processes that occur in each context are not independent from each other (Bronfenbrenner, 1986; Bronfenbrenner & Morris, 1998). The capacity for children to learn from early experiences depends on the extent to which each of the contexts of which they are a part provide opportunities and supports for growth (Scarr & McCartney, 1983; Shonkoff & Phillips, 2000). According to ecological theory, environments that provide opportunities and supports for growth are those in which interactions between children and their environments, known as proximal processes, can be both consistent and predictable (Bronfenbrenner & Evans, 2000; Bronfenbrenner & Morris, 1998). Chaotic environments, those characterized by high levels of frenetic activity, a lack of structure, unpredictability in everyday activities, and high levels of ambient stimulation limit the extent to which proximal processes are either consistent or predictable (Bronfenbrenner & Evans, 2000; Wachs & Evans, 2010).

Children are spending increasingly more time in various out-of-family contexts, highlighting the importance of understanding how children's experiences across multiple contexts combine to influence their development and the importance of understanding the role of chaos in interfering with children's growth in those contexts. Taking advantage of a national sample of low-income children attending Head Start, the overall purpose of the present study was to examine both continuity and discontinuity in children's exposure to chaos across their home and early learning and care (ELC) classroom settings to determine *how* children's exposure to chaos in each context combine to either promote or interfere with their social-emotional and cognitive development over a year of preschool. Continuity in children's experiences across the home and classroom contexts—the degree

to which both contexts are similarly chaotic or non-chaotic—can combine to create a cumulative effect on development whereas discontinuity in children's experiences across settings—the extent to which the level of chaos differs across setting—can combine to create a compensatory or lost resources influence on development (Bradley, 2010; Bradley, Burchinal, & Casey, 2001; Phillips, 2006). The absence of chaos in one setting may buffer children from (i.e., compensate for) high levels of chaos in another. Alternatively, chaos in one setting may negate the absence of chaos in the other setting, creating a lost resources influence on development.

The advantages of studying how young children's experiences of chaos combine across their home and ELC classroom settings in a sample of children beginning their first year of Head Start—a federal program designed to promote school readiness among children from low-income families—were two-fold. First, though children from families of all income levels experience chaotic environments, chaos is more prevalent among low-income families, which makes it difficult to disentangle the influence of chaos on development from the influence of being low-income (Evans, 2004; Evans et al. 2005). One way to isolate the influence of chaos from that of low-income is to study children's experiences of chaos within a sample of low-income children, which restricts the variability in income. Second, using data from a sample of children attending Head Start means that the present study is also an examination, specifically, of what conditions promote or interfere with children's developmental gains over a period of time during which children were participating in an early intervention program. Thus, the present study not only provides additional insight into how children's early experiences combine across important contexts for their early development, but also has the potential to inform policy efforts at promoting children's development through early interventions.

Chapter II: Background

Early childhood—which research has established as a critical period for establishing a foundation to support later development and well-being—is increasingly likely to take place within multiple contexts. The specific mechanisms and processes by which environmental contexts influence children's development have been the subject of decades of research (Bronfenbrenner & Evans, 2000; Bronfenbrenner & Morris, 1998). Only relatively recently has the specific influence of chaotic environments on children's development garnered the attention of researchers. Despite a recent consensus among researchers that chaos remains not a well-developed construct (Wachs & Evans, 2010), there has been a decade-and-a-half long attempt to understand chaos and its influence on children's development. The result of which has been, somewhat ironically, a chaotic and seemingly disjointed body of research, much of which is reviewed below. Researchers have used individual indicators and indices of chaos to study the relations between chaos and children's development, but the specific indicators examined, whether individually or combined into indices, vary greatly across study. That said, chaos, however defined and measured, consistently predicts poorer social-emotional and cognitive functioning in children over and beyond the influence of socioeconomic status.

The prior research linking chaotic environments to children's early development was examined in multiple phases. The first section of the review focuses on the varied definitions of chaos that appear in the literature. The second section of the review focuses on the multitude of indicators used by researchers to operationalize and measure chaos. Because the definition of chaos varies across studies, so to have researchers' methods of measuring chaos. Third, a review of the prior research linking chaos within the home and early learning and care settings to children's development is presented. Finally, the

limited work measuring chaos across settings is reviewed along with prior work focused on children's more general experiences across the home and early learning and care settings.

CHAOS: DEFINITIONS AND ASSESSMENT

Broadly, the term "environmental chaos" is a theoretical construct denoting a system of overly stimulating environmental characteristics that is adversely related to children's development and well-being (Wachs & Evans, 2010). Prior research has long shown that the relation between stimulation and development is non-linear—both excessive stimulation and too little stimulation are problematic for children's development, and there is a developmentally appropriate level of stimulation somewhere in the middle (Wohlwill, 1970; Wohlwill & Heft, 1987). There is little consensus among researchers, however, as to exactly how or when overstimulation turns into a chaotic environment. Overstimulation from factors including noise and crowding are generally accepted as critical components of chaos, but a variety of other environmental and temporal factors contribute to chaotic environments as well (Wachs & Evans, 2010).

Chaotic Definitions of Chaos

Definitions of chaotic environments are numerous and have included terms such as: "environmental confusion" (Matheny et al., 1995, p. 430); "systems of frenetic activity, lack of structure, unpredictability in everyday activities and high levels of ambient stimulation" (Bronfenbrenner & Evans, 2000, p. 121); "chronic and persistent instability" (Lichter & Wethington, 2010, p. 15); "disruptions in multiple domains, including sensory overload, physical crowding, and routine family life" (Fiese & Winter, 2010, p. 49); "sudden, unexpected, and unintended disruptions" (Dunn, Schaefer-McDaniel, & Ramsey, 2010, p. 178); "an environment characterized by high levels of

noise, crowding, and instability as well as a lack of temporal and physical structuring (few regularities, routines, or rituals; nothing has it's time or place)" (Wachs & Evans, 2010, p. 5).

Recently, researchers sought to create an organizational framework to provide order to the varying definitions of chaos (Brooks-Gunn, Johnson, & Leventhal, 2010). Six constructs were identified as key dimensions of chaos: crowding and density, noise and confusion, clutter and messiness, fluidity and instability of residents, lack of predictability and routines, and low supervision and monitoring. On the basis of conceptual reasoning, the first three constructs were termed "disorder" and the last three were termed "turbulence." When disorder and turbulence/instability were originally proposed as central constructs, it was unclear if the wide range of chaos indicators used by researchers statistically mapped onto those two constructs, or if it was only a conceptual distinction. A recent factor analysis showed that 10 household chaos indicators (the number of people moving in and out of the household, total number of people in the home, total number of household moves, number of changes in primary and secondary caregivers, household density, number of hours watching TV, preparation for home visits, cleanliness of the home, and neighborhood noise) could be represented by two factors: disorganization and instability, which mapped on well to the two constructs of disorder and turbulence proposed by Brooks-Gunn and colleagues (Vernon-Feagans et al., 2012).

Though varied, a few notable commonalities run through all of these definitions. First, the environmental characteristics that constitute the chaotic system or pattern of activity are all developmentally disruptive. Developing children require regularity, consistency, predictability, and controllability in their immediate environment and chaotic environments deprive developing children of the "well-structured, predictable,

and sustained" interactions with the "persons, objects, and symbols in [their] immediate environment critical to fostering and sustaining healthy development" (Evans et al., 2005, p. 560). Chaos, then, is the confluence of unpredictable, uncontrollable, and distracting environmental characteristics that interfere with the extent to which interactions between a child and his or her physical and social environment occur regularly or even at all.

Second, chaos is complex, but researchers have not yet clarified at what point a setting becomes chaotic (Maxwell, 2010). In other words, how many and which specific environmental characteristics create a chaotic environment? Chaos is a subjective phenomenon that can be experienced similarly or differently depending on a child's personality or temperament, the place or context, and the child's history and experiences (Dunn et al., 2010). This suggests that the number and combination of individual environmental characteristics necessary to create chaos varies across children and that as long as they create a pattern of activity in which the consistency and predictability of proximal processes are limited, any number or combination of environmental characteristics can be considered chaos.

Taken together, the numerous attempts by researchers to provide a conceptual and operational definition of chaos provided guidance on how chaos was defined in the present study. Chaos was henceforth defined as *a system of disruptive environmental characteristics that interfere with a child's ability to engage in predictable, controllable and consistent interactions and exchanges with their environment.* Based on the prior research, it did not make sense to restrict the system of disruptive environmental characteristics to a particular number or combination of characteristics. Rather, it made more sense to define chaos by its function: a chaotic environment can be made up of any number or combination of disruptive characteristics so long as they interfere with predictable, controllable, and consistent proximal processes.

Chaos and Socioeconomic Status

Chaos is not evenly distributed throughout the population—children from low-income families are more likely to experience chaotic conditions than are their higher-income peers (Bradley, Corwyn, McAdoo & Garcia-Coll., 2001; Evans et al., 2005). Children growing up in low-income or poor families are more likely to live in crowded, noisier, and poor-quality housing, to experience less structure, routine, or predictability in their daily lives, to be exposed to family disruption, to change residences, and to experience lower-quality child care than children growing up in non-poor families (Evans, 2004; Evans et al., 2005).

Although chaos overlaps with some of the conditions of low socioeconomic status (SES), chaos is a distinct construct from SES. The conceptual distinction revolves around the availability and access to resources in the environment. Socioeconomic disadvantage reflects an insufficient availability of resources that in turn, has negative consequences for children's development. In contrast, chaos is not unavailability of resources in the environment, but instead, reduced access to whatever resources are available, whether few or plenty. Definitions of chaotic environments make no assumptions about the availability of sufficient resources. Rather, chaotic environments are those in which children's interactions and exchanges with available resources are disrupted.

Empirically, there is consistent evidence that chaos is distinct from socioeconomic status—chaos has been linked to development in middle-class samples, the significant association between chaos and development persists after family socioeconomic status (SES), including income, parental education, and parental occupation is controlled, and longitudinal studies show that changes in chaos are associated with changes in developmental outcomes even when no changes in SES have occurred (Corapci & Wachs, 2002; Wachs & Evans, 2010). Prior research also shows that

chaos can function as a mechanism through which low SES influences development and additionally, that the influence of chaos on development cannot be explained by income or SES (Evans, Eckenrode, & Marcynyszyn, 2010; Evans et al., 2005).

Chaos and Developmental Processes

Chaotic environments pose risks for children's development because they are disruptive to multiple developmental processes, the most central of which, according to ecological theory, is the disruption of predictable and sustained proximal processes (Bronfenbrenner & Evans, 2000; Wachs & Evans, 2010). In chaotic environments, children are less able to depend on or predict when certain interactions will occur (Evans et al., 2010a). The specific ways in which chaos interferes with the duration, consistency, and predictability of children's interactions with their immediate surroundings are highlighted throughout the present review of the literature. Also highlighted in the review is the role of parenting as a mediating process. Chaos reduces the quality of parenting and parent-child interactions, which in turn predict poor functioning in children.

Based on developmental theory, researchers have proposed other important developmental processes that are similarly disrupted in chaotic environments, though few have been empirically examined. Children in chaotic environments may develop strategies to filter out high levels of unwanted stimulation, which may result in children also filtering out developmentally facilitative stimulation (Matheny et al., 1995). Habituation to auditory input, specifically, may deprive children of exposure to important language input (Wachs & Evans, 2010). The lack of structure, predictability and consistency in chaotic environments can interfere with children's abilities to develop self-regulatory behaviors, a sense of mastery and self-efficacy, or competency—the sense that one is an effective agent in coping with one's surroundings and may promote learned

helplessness (Ackerman & Brown, 2010; Evans & English, 2002; Evans et al., 2005; Evans et al., 2010a; Wachs & Evans, 2010). Physiological responses to chaotic environments are also possible—the constant and uncontrollable demands put on a child by chaotic environments result in children's inability to regulate their stress (Wachs & Evans, 2010).

INDICATORS OF CHAOS AND EARLY DEVELOPMENT

Numerous and varied methods to measure chaos have resulted from the numerous definitions of chaos. In practice, researchers have selected variables on the basis of theoretical or conceptual importance and analyzed them individually or combined them as an index. The empirical basis for individual variables that may contribute to environmental chaos is large. In comparison, the empirical basis for chaos defined as an aggregate variable, which may be the most appropriate for representing chaos as a system or pattern, is relatively small (Ackerman & Brown, 2010). Using the framework put forth by Brooks-Gunn and colleagues (2010) that highlights disorder and turbulence as two central constructs within chaos, the links between individual indicators of chaos and development are reviewed here. Some of the available research has also focused on the processes by which chaos and development are linked. Though the focus of the current study is establishing the relations between chaos and development across children's early contexts and not on the processes by which the two are linked, the research highlighting process is reviewed here when appropriate.

Disorder

The "disorder" aspect of chaos is characterized by high levels of noise, excessive crowding, clutter, and a general lack of structure (Brooks-Gunn et al., 2010). Prior research has focused primarily on two aspects of disorder in young children's

environments—overcrowdedness and high levels of noise—both of which are consistently related to poor social-emotional and cognitive functioning in children. In the present study, indicators of crowding but not noise were available in the data so only the research linking crowding to poorer developmental outcomes is highlighted here.

Crowding

In the Home. Household crowding is typically measured as a ratio of people to the number of rooms in a house. Overcrowding is related to physical and psychological withdrawal and to a state of being physically and emotionally drained (Gove et al., 1979). Findings across studies have demonstrated that environments with high levels of crowding are related to low-levels of well-being for both parents and children and that the influence of crowding on children's outcomes may be mediated by parenting behaviors.

Holding constant important demographic characteristics including socioeconomic status, parent age and parenting stress, parents in overcrowded homes are more likely to be less aware of children's activities, to experience more mental health problems and physical fatigue, to perceive the environment as uncontrollable, to be less responsive to their children, and to engage in harsh and inconsistent discipline than are parents in less crowded homes (Corapci & Wachs, 2002; Dumas et al., 2005; Gove et al., 1979; Wachs, 1993).

Children in crowded homes demonstrate more behavior problems and have worse social-emotional, cognitive, and achievement outcomes than children in less crowded homes over and above the influence of demographic controls (Conley, 2001; Dumas et al., 2005; Evans, Ricciuti, Hope, Shoon, Bradley, Corwyn, & Hazan, 2010b; Petrill et al., 2004; Pike, Iervolino, Eley, Price, & Plomin, 2006; Supplee, Unikel, & Shaw, 2007). Longitudinal work has shown that the influence of crowding on children's development

persists over time. In a study of young boys from low-income families, maternal reports of crowding at age 3 predicted mothers' reports of externalizing behavior at age 4 and teachers' reports of externalizing behavior at school when children were 5½ years old (Supplee et al., 2007). Other work has shown that parental behaviors mediate the effects of crowding on children's development. In a study of 36-month-old children participating in either the NICHD Study of Early Child Care and Youth Development (SECCYD) or the U.K. Millennium Cohort Study, decreased maternal responsiveness mediated the relation between residential crowding and cognitive measures (Evans et al., 2010b).

In the Classroom Setting. Important differences exist in how researchers have studied crowding in early learning and care (ELC) classroom settings compared to the study of crowding in the home. The composition of people in children's home environments may include similarly-aged siblings or relatives and a number of related or un-related adults, while the composition of people in children's ELC classrooms include a large number of similarly-aged children and few adults. Consequently, overcrowding in ELC classroom settings is often associated with increased competition among children over material resources including toys and play equipment—an experience that is less frequent in the home where presumably there are fewer children with whom to compete (Evans, 2006; Maxwell, 1996; Smith & Connolly, 1977).

The increased competition over material resources in ELC settings means that the number and availability of resources in a classroom becomes an important determinant of the relation between crowding and children's development (Smith and Connolly, 1977). In a small sample of four- and five-year-old children attending one of three ELC settings (two were center-based and one was home-based), only the ratio of children to the number of activity areas in the ELC setting remained associated with off-task behaviors or not being in play at all after demographic controls were taken into account (Kantrowitz

& Evans, 2004). Neither the overall number of children in the room nor the number of activity areas remained significant predictors of observed off-task behaviors, which suggests that the influence of crowding within an ELC setting may depend less on the actual group size, and more on the resulting competition for resources. A large group size may not be particularly disruptive to children's ability to engage with their environment so long as there are sufficient resources.

Children's temperamental and personality characteristics also emerge as important moderators of the relation between crowding and children's early development in ELC settings. In a study of 5-year-old children attending preschool who were exposed to experimentally-induced crowded conditions, children's ability to adapt to crowdedness depended on their personality characteristics (Loo, 1978). Children who were high on hyperactivity-distractibility, anxiety, behavior disturbance, or impulsivity spent less time engaged in prolonged or involved toy play, showed more negative affect (anger, distress, and boredom) were less able to regulate their stress compared to other children.

Crowded ELC classrooms also negatively influence the well-being of caregivers in the setting, which in turn may be disadvantageous for children's development. Teachers in crowded classrooms have to adopt different strategies from those they might have chosen in less crowded classrooms (Fagot 1977)—planning the days' activities more carefully and being more directive with children. In the NICHD Study of Early Child Care and Youth Development, a lower child-staff ratio, which is not a perfect marker for crowding, but is generally accepted by researchers as a positive attribute of a classroom setting and one that would be opposite of a overcrowded setting, predicted higher quality caregiving (e.g., sensitivity, positive emotional climate, and cognitive stimulation), which in turn predicted child's cognitive social outcomes at 54 months (Network, 2002a).

Turbulence

The "turbulence" dimension of chaos is characterized both by the lack of predictability and routines and by instability, each of which generally predict poorer social-emotional and cognitive development in children compared to environments that are routine and stable (Brooks-Gunn et al., 2010). Conceptually and empirically, the study of routine in children's environments has been much more straightforward than the study of instability in children's environments. Instability in children's lives has been examined in a variety of ways including changes in family composition (the definition of which varies because family composition changes occur for a variety of reasons including children's separations from their caregivers, the exit of an adult partner or a relative, the entrance of an adult partner or relative, and the birth of siblings), shifts in non-family members with whom the child interacts (e.g., midyear teacher change), and residential and school mobility (Brooks-Gunn et al., 2010; Wachs & Evans, 2010). Across the varying definitions and operationalizations though, instability represents a chaotic and unpredictable environment because the identity of the persons and places with whom the child is interacting is not constant, which interferes with the consistency and predictability of proximal processes. Regardless of whether the changes associated with instability are positive or negative, instability represents an unpredictable family environment for children (Marcynyszyn, Evans, & Eckenrode, 2008).

Within the home, children's experiences of routines and instability in their caregiver relationships have each received considerable attention in the literature. Comparatively less research has focused on the influence of residential instability on young children, but tentative conclusions can be drawn from studies of older children. Within the ELC setting, surprisingly little attention has been given to the ways in which children's day-to-day experiences within ELC settings are structured (Fuilgni, Howes,

Huang, Hong, Lara-Cinisomo, 2012). Greater focus has been granted to children's experiences of instability in the classroom, namely, experiencing changes in classroom caregiver or experiencing high arrangement multiplicity (experiencing a variety of different care arrangements within a given day, week, or month) (Adams & Rohacek, 2010). Additionally, research on the negative impact of chronic absences in elementary school informs our understanding of how young children's chronic classroom absences can also create instability in their ELC experiences (Chang & Romero, 2008).

Lack of Routine

In the Home. Family routines, which require repetition, expectations for attendance, assignment of roles, and deliberate planning, are central to children's development because they create a context in which proximal processes can be both consistent and predictable (Fiese & Winter, 2010, p. 56). Routines within any context provide children with a sense of control and security, allow for a sense of mastery over one's environment, and serve to protect children from stress (Evans et al., 2005; Kliewer & Kung, 1998). Much of the association between family routines and children's early development is indirect (Spagnola & Fiese, 2007). Family routines, particularly mealtimes and bedtime reading rituals, provide an opportunity for family engagement and monitoring and involve young children in activities that contribute to vocabulary enrichment, social skill building, and later academic achievement (Fiese & Schwartz, 2008; Spagnola & Fiese, 2007).

Establishing and maintaining family routines is particularly helpful for young children in disadvantaged families. Several studies of low-income children show that maintaining structure and predictability in the home environment operates as a buffer for the risks of low-income environments. In a study of 36-month-old children participating

in an early intervention program, children in families with predictable family routines demonstrated fewer internalizing behavior problems than did children in families with few routines after controlling for race/ethnicity, caregiver, education, and treatment group (Bono, Dinehart, Dobbins, Claussen, 2008). Similarly, in a study of 55-month-old Black children attending Head Start, routines in the home were positively associated with children's social competence and were associated with greater interest, participation, cooperation, and compliance in their preschool environments compared to children who experienced few family routines (Keltner, 1990). In the Fragile Families Study, routines, particularly language-based bedtime routines (reading, talking, singing), when children were 36 months old predicted longer sleep duration and higher cognitive skills at 60 months (Hale, Berger, LeBourgeois, & Brooks-Gunn, 2011).

In the Classroom Setting. Routines in the early learning and care (ELC) classroom setting also presumably provide a context in which children's interactions with their classroom setting can be both consistent and predictable. Although the relation between classroom routines and children's early development has not been examined thoroughly, widely used observational scales of ELC settings include routines and structure as markers of a high-quality environment. The Environment Rating Scales for early childhood environments (ECERS-R), infant/toddler environments (ITERS-R), and family child care environments (FCCERS-R) each include a subscale assessing the quality of the program structure and specifically the schedule within the setting (Harms, Clifford, & Cryer, 2005).

Evidence from one recent study of low-income children attending a variety of ELC settings showed that children in classrooms with structured, but balanced daily routine had higher scores on cognitive tests than children in classrooms where a higher proportion of the day was spent in free-choice activities (Fuligni et al., 2012). This

suggests that although free-play experiences are important for some aspects of young children's development, children's cognitive growth benefits from structured time as well.

Instability

In the Home. Stability in both the relationships children have with the people in their home environment and in the physical location of their home establishes consistency and predictability in young children's lives. In contrast, instability "challenge[s] the daily continuity and cohesiveness of family life for a child" (Ackerman et al., 1999b, p 258). Children who are exposed to multiple changes in family structure (henceforth referred to as partnership instability) or who experience multiple residential relocations (henceforth referred to as residential mobility) generally have poorer outcomes than children who grow up in stable families (Ackerman et al., 1999b; Cavanagh & Huston, 2006; Osborne & McLanahan, 2007). Though some of the association between instability and children's outcomes may be due to selection—there are potential third variables that influence both the likelihood of instability and child outcomes (e.g., socioeconomic characteristics including race/ethnicity and education, age, health and marital/relationship history)—both theory and prior research support an association between instability and child well-being (Osborne & McLanahan, 2007).

Both ecological theory and social stress theory support a relation between instability and children's outcomes that is not due to socioeconomic status or selection. According to ecological theory, instability, even when positive, disrupts the continuity and predictability of children's developmentally supportive interactions and exchanges with their environment (Marcynyszyn et al., 2008). According to social stress theory, family instability is associated with children's outcomes through changes in parent

psychological well-being and parenting (George, 1993). The changes in resources and routines associated with family instability are in turn associated with stress and poor psychological well-being which are subsequently associated with negative parenting behaviors, lower quality parent-child interactions and poorer child outcomes.

Partnership instability during early childhood is associated with aggressive, anxious and depressed behavior in children as well as lower verbal ability over and above the influence of important demographic characteristics (Cavanagh & Huston, 2006, 2008; Cooper, Osborne, Beck & McLanahan, 2010; Osborne & McLanahan, 2007). Moreover, there is a cumulative influence of experiencing multiple partnership transitions over the course of early childhood that persists over time (Cavanagh & Huston, 2008; Osborne & McLanahan, 2007). As posited by social stress theory, maternal stress and poor parenting significantly mediated the relation between partnership instability and children's outcomes in a sample of children from low-income families (Osborne & McLanahan, 2007). Other research shows that the negative influence of family instability on children's outcomes is attenuated in family environments that maintain high levels of emotional and material resources (Cavanagh & Huston, 2008).

Though few studies have examined the association between residential mobility to development during early childhood, available evidence suggests that residential mobility, like partnership instability, has a negative influence on children's development, but these effects may depend on characteristics of the child including gender and temperament. In the Early Childhood Longitudinal Study – Kindergarten cohort (ECLS-K) high residential instability during early childhood was correlated with poorer math, reading, and general knowledge skills and lower levels of self-regulation and social competence in 6-year-olds (Gershoff, Raver, Aber, & Lennon, 2007). High residential instability was also correlated with higher levels of both internalizing and externalizing

behavior problems. In a study of Canadian children, residential moves during early childhood were related to higher levels of emotional and behavioral problems in first grade after children's school-entry behaviors, gender, mothers' education, and the school- and classroom-level indicators were accounted for (Hoglund & Leadbetter, 2004). Additional analyses showed that residential moves were particularly disadvantageous for children who were shy, socially withdrawn and were in classrooms with low average levels of pro-social behaviors such as sharing, helping, and caring. These findings are in line with other work showing family instability, including residential mobility, during early childhood was related to behavior problems in first grade primarily for children with less adaptable temperaments (Ackerman et al., 1999b).

Residential mobility consistently predicts poorer cognitive and social-emotional development in studies of older children (Adam & Chase-Lansdale, 2002; Astone & McLanahan, 1991). Data from the National Education Longitudinal Study (NELS) show that students whose families moved during adolescence were more likely to change schools and to drop out than children in families who did not move (Rumberger & Larson, 1998). In the 1988 National Health Interview Survey of Child Health, a representative sample of over 10,000 children in grades 1-12, children who moved 3 or more times had a significantly increased risk for emotional/behavioral problems, receiving psychological help, repeating a grade, and being expelled or suspended compared to children who never moved (Simpson & Fowler, 1994). These findings held even after age, race, geographic region, mothers' marital status, maternal education, and poverty were taken into account.

Some of the association between residential mobility and negative outcomes in adolescents is due to the concomitant school change sometimes associated with movement to a different neighborhood (Crowder & Teachman, 2004; Rumberger &

Larson, 1998). This suggests that residential mobility during early childhood may interfere with early development through a similar process if early residential mobility is concomitant with a change in children's ELC setting. As reviewed below, changes in ELC settings negatively influence children's early development. At any stage in development, residential mobility represents a change in a proximal context that disrupts regular and consistent proximal processes—a change that may be especially disruptive when it coincides with an additional change in an ELC or school setting.

In the Classroom Setting. Children's early learning and care (ELC) experiences can be unstable for a number of reasons including staff turnover within settings, experiencing different care arrangements per day or week (multiplicity), and experiencing different caregivers and classrooms during infancy, toddlerhood, and preschool (Tran & Winsler, 2011). Exposure to multiple child care arrangements, changing teachers and/or settings interfere with the child's "sustained and progressively more complex interactions with, and activity in, the learning environment" (Maxwell, 2010, p. 83) and are associated with negative outcomes for children, particularly younger children, who are "less mobile and less socially flexible [and] are more dependent on child-care teachers than older children" (Howes & Hamilton, 1993). In the NICHD Study of Early Child Care and Youth Development (SECCYD), the increased use of multiple arrangements between 24 and 36 months was associated with small but significant increases in externalizing and internalizing behavior problems and decreases in pro-social behaviors over the same time period. At 24 months, multiple child care arrangements were associated with more externalizing and internalizing problems, but at 36 months, the number of arrangements was unrelated to behavior problems. In another study, children who experienced more changes in their primary teacher from age one to age four were observed and rated as more aggressive four-year-olds than children who experienced

fewer changes (Howes & Hamilton, 1993). This was particularly salient for young toddlers (between 18 and 24 months).

Instability in children's ELC experiences can also occur because of children's irregular attendance. Regular attendance is important to ensuring that young children develop a strong foundation of social and academic skills and may be particularly critical for children from low-income or poor families who are less likely to have the resources available in the home to help children make up for the time lost in the classroom (Chang & Romero, 2008). Chronic absences in Kindergarten were associated with lower academic performance and gaining fewer literacy skills in the first grade (Chang & Romero, 2008; Ready, 2010). Chronic or frequent absences likely also make it difficult for children to establish and maintain relationships with their caregiver and peers, which could interfere with social-emotional development. Inconsistent attendance at child care may reduce the potentially positive benefits of the supportive routines a child might experience in a well-organized and well-managed child care setting (Bradley, 2010).

CHAOTIC ENVIRONMENTS AND EARLY DEVELOPMENT

Contextual factors usually do not occur in isolation and if chaotic environments are to be understood as a "cluster" or "system" or "pattern" of environmental characteristics, then the most accurate representations of chaos are aggregates or cumulative indices of disruptive environmental characteristics (Ackerman et al., 1999a). Although relatively few studies have examined the relations between chaos as an aggregate measure of environmental risk and children's development, those that have continue to demonstrate the deleterious influence of chaotic environments on children's social-emotional and cognitive functioning.

Chaotic Home Environments

Aggregate measures of chaos have typically focused on one of the two constructs—disorder and turbulence/instability—identified as central to understanding chaos (Brooks-Gunn et al., 2010). The Confusion, Hubbub, and Order Scale, aptly abbreviated as the CHAOS, is a parent-reported measure of the degree to which a household has high levels of noise, crowding, and an overall lack of structure (Matheny et al., 1995). The Purdue Home Stimulation Inventory (PHSI) assesses the physical environment through observations of crowding (i.e. number of siblings, rooms-people ratio, presence of a stimulus shelter – a quiet and less crowded place in the home where children can go), availability of objects, variety of toys, the degree to which the home allows the child's visual and motor exploration, the number of stimulus sources (e.g., TV), ratings of noise level and sound intensity (Wachs & Camli, 1991). Both the CHAOS and PHSI assess disorder to a greater extent than turbulence or instability.

Parents in chaotic home environments, assessed using both the CHAOS and the PHSI, consistently display negative parenting behaviors including less parental involvement, less verbal interaction, less responsiveness to children's vocalizations or distress, verbal interference with exploration, and ignoring of children's attentional bids (Coldwell, Pike & Dunn, 2006; Corapci & Wachs, 2002; Matheny et al., 1995; Wachs & Camli, 1991). These associations all remain significant after controlling for individual parental characteristics including parental education, income, stress, marital well-being, psychological well-being, and parental child-rearing beliefs.

Higher scores on the CHAOS predict poorer social-emotional development and cognitive functioning in children compared to homes lower in chaos. Two studies of British twins enrolled in the Twins Early Developmental Study (TEDS) used the CHAOS to assess the relations between environmental chaos and cognitive ability in three- and

four-year-old twin pairs. Scores on the CHAOS partially mediated the shared environmental influences associated with verbal and nonverbal measures of cognitive ability after controlling for SES (Petrill et al., 2004; Pike, Iervolino, Eley, Price & Plomin, 2006). SES and CHAOS were the strongest predictors of both verbal and nonverbal abilities at age 4, out of eight domains of environmental risk that also included minority status, maternal medical factors, twin medical factors, maternal depression, parental feelings toward the twins, and parental discipline. The authors propose that children growing up in a well-ordered home may be better able to explore and interact in their environment, thereby fostering cognitive development. In another sample of English children, children living in homes that received high scores on the CHAOS had higher levels of parent-reported behavior problems, over and above parenting behaviors, child age, and gender (Coldwell et al., 2006). Using two samples of children that differed in mean child age, socioeconomic status, and ethnicity, high scores on the CHAOS were related to higher levels of behavior problems, particularly anger, aggression, and other externalizing problems (Dumas et al., 2005).

Other aggregate measures of chaotic environments have assessed children's experiences of turbulence/instability within the home. In a sample of children from economically-disadvantaged families, indicators for an aggregate of family instability were selected based on the extent to which they challenged the "daily continuity and cohesiveness of family life for a child," which resulted in a family instability index that described "a chronically chaotic and unpredictable family environment" (Ackerman et al., 1999b, p. 258). The indicators included residential mobility, the number of intimate adult relationships involving the primary caregiver, the number of families with whom the child had lived, serious childhood illness and other recent negative life events. High

levels of family instability predicted poor social-emotional functioning in children as reported by their caregivers and teachers.

Research using measures integrating disorder and turbulence/instability also shows that chaotic environments pose a risk to children's early development. This research has been careful to highlight the distinction between SES and chaos as influences on development. A cumulative index of contextual risk including aspects of disorder (e.g., four or more children in the family) and turbulence/instability (e.g., child had lived with more than one family, family currently contains a single adult, three or more changes in caregiver intimate relationships over the course of the child's life, four or more changes of family residences) predicted problem behaviors in a sample of children from economically-disadvantaged families (Ackerman et al., 1999a). In another study of low-income children, chaotic home conditions, assessed by an index that included residential crowding, TV background noise, and transitions in caregivers' residential partners, predicted low-income preschool children's poor sleep habits and helpless/hopeless responses to insoluble and soluble puzzle tasks after controlling for child age, gender, race/ethnicity, and verbal ability (Brown & Low, 2008). Homogenous samples help isolate the influence of chaos from SES by restricting the amount of variability in income that can covary with chaos. Researchers in another study added items about routines and rituals in the home to the CHAOS and found that chaotic environments partially mediated the relations between income and adolescent children's learned helplessness, psychological distress, and self-regulatory behaviors (Evans et al., 2005). Demonstrating that chaos is a mechanism by which income predicts development also supports chaos as a distinct construct from SES.

Chaotic Early Learning and Care Settings

The use of aggregate representations of chaos incorporating multiple disruptive environmental characteristics has almost entirely been allocated to understanding children's experiences of household chaos. One notable exception exists. Wachs and colleagues adapted the CHAOS for use in an ELC setting (Wachs, Gurkas, Kontos, 2004). The Life in Early Childhood Programs (LECP), scale assesses teachers' perceptions of use of space, crowding, environmental traffic, and the degree of control and organization in the classroom. The quality of the child care centers was also evaluated using the Early Childhood Environmental Rating Scale (ECERS). In their sample of 86 preschoolers enrolled in 23 classrooms in 8 centers, both the level of chaos and the quality of the child care setting contributed unique predictive variance in children's compliance behaviors indicating that quality and chaos are complementary, but not identical measures of the child care context. Unlike the finding that chaos in the home where the level of chaos is linked to parenting behaviors, caregiver control strategies did not mediate the relation between chaos and children's compliance. The authors propose that the presence of multiple staff members in an ELC setting may minimize the impact of chaos on the behavior of any one staff member.

CHAOS ACROSS EARLY CHILDHOOD CONTEXTS

Decades of research have established that children's development is influenced by each of the interrelated and often nested contexts of which they are a part and that the best predictors of children's development are those that incorporate children's risk or advantage across context (Bronfenbrenner, 1979; Sameroff, Clarke-Stewart, & Dunn, 2006; Sameroff, Gutman, Peck, & Luthar, 2003). That is, a single risk rarely reflects the reality of most children's lives, but rather the constellation of risks (Sameroff et al., 2003, p. 379).

The research reviewed to this point has focused on children's experiences of chaos within the home context separate from their experiences within the ELC context. Far fewer studies have examined how the characteristics of each context, namely the protective and risk factors that exist in each, combine to influence development (Bronfenbrenner, 1979; Watamura et al., 2011). With the exception of a few studies on the influence of crowding across context, no studies have focused specifically on continuity and discontinuity in children's experiences of chaos across the home and ELS settings (Bradley, 2010).

Children's exposure to crowding at home influences the social behavior of children in crowded child care contexts (Liddell & Kruger, 1989; Maxwell, 1996). In a sample of 46 children ranging in age from 21 to 51 months attending an over-crowded South African township nursery (e.g., staff-to-child ratios of 2:71) showed that crowding at home predicted children's initial behavior responses in the nursery (Liddell & Kruger, 1989). Children from crowded homes spent more time as onlookers, less time in object play, and more time unoccupied than children from less crowded homes, suggesting that crowding in both the home and nursery contexts was cumulative. Analyses of data from a sample of 114 preschool-aged children attending Head Start centers or other publicly-funded child care centers similarly showed that children who experienced high levels of crowding in both the home and the child care setting were rated the highest by their teachers on behavior and emotional problems (Maxwell, 1996). Crowding in both the home and child care setting did not predict children's cognitive development.

Evidence from research investigating how other aspects of home and child care settings combined can be used to understand how children's exposure to chaos across settings may influence their development. In several studies using data from the NICHD Study of Early Child Care and Youth Development, even though factors in the home

environment relative to the child care setting are stronger and more consistent predictors of young children's early development (Network, 2001; 2002b), factors in each do combine to predict development. In one study, main effect analyses showed that factors in the home, namely maternal sensitivity, responsiveness and psychological adjustment predicted attachment security in infants, but that none of the child-care factors including positive caregiving, amount of care, age of entry or stability of care predicted attachment security (Network, 1997). Interaction effect analyses, however, showed that when considered within the context of the home environment, infants' child care experiences did predict their attachment security. Exposure to low levels of maternal sensitivity and responsiveness in the home environment *and* to low levels of positive caregiving in the child care setting cumulated to predict insecure attachment in infants. Moreover, the salience of factors in the home environment for attachment security depended on the quality of the child care experience. Infants in low-quality care were more strongly influenced by their mothers' sensitivity and responsiveness than were children in high-quality care, for whom the likelihood of a secure attachment was the same regardless of the mother's behavior.

In another study, the combination of exposure to observed cognitive stimulation across three important contexts for early childhood development—the home, child care setting, and first-grade classroom—cumulated such that children who experienced high levels of cognitive stimulation in all three had the highest rates of learning compared to other children (Crosnoe et al., 2010). Importantly, the cumulative function only held true when one of the contexts in which children were exposed to high levels of cognitive stimulation was the home environment.

The combination of exposure to high- or low-quality home and child care environments similarly cumulated across context to predict children's social-emotional

functioning in a recent analysis of the NICHD SECCYD (Watamura et al., 2011). Children who were exposed to both low-quality home environments (assessed using observations of factors including maternal sensitivity and responsiveness, the physical environment, availability of learning materials, and language stimulation) and low-quality child care environments (assessed using observations of factors including caregiver's sensitivity, stimulation, detachment, and positive regard) had the highest levels of problem behaviors and the lowest levels of prosocial behaviors. When children experienced discontinuity in quality across their home and child care settings, there was additional evidence that high-quality child care could compensate for *low*-quality home environments, but also that exposure to *high*-quality home environments was protective no matter whether the quality of the child care setting was high or low.

Together these findings suggest that children can have similar experiences in both the home and ELC contexts (continuity) that cumulate to influence development. Continuity across setting can be advantageous for development when both settings are characterized by protective factors or continuity can be disadvantageous for development when both settings are characterized by risk factors. Alternatively, children can have varying experiences across the home and ELC contexts (discontinuity) that combine to produce a compensatory function.

Children who experienced disadvantage in both the home and child care contexts were at greater risk for developmental difficulty than children who experienced disadvantage in only one or no context, while children who experienced advantage in multiple contexts had the best developmental outcomes (Crosnoe et al., 2010; Network, 1997, 2002b). Thus, experiencing chaos in both the home and ELC setting may similarly cumulate to put children at greater risk than children who experience chaos in only one or no context. Children who were in poor quality home environments benefited from the

compensatory influence of high-quality care (Watamura et al., 2011), which suggests that discontinuity in children's experiences of chaos across setting may have a similar compensatory influence such that predictability and consistency in the ELC setting can compensate for a chaotic home environment. Alternatively, because the home environment is a more consistent and stronger predictor of children's development relative to the child care context, the nature of the home environment may override the influence of the ELC setting (Crosnoe et al., 2010; Network, 2001; Watamura et al., 2011).

Chapter III. Current Study

As very young children continue to spend more of their time in multiple contexts, it becomes increasingly important to understand how to promote children's growth *across* each of the environments that influence their development. The focus of this study was on the associations between children's exposure to chaos within and across context and children's subsequent social-emotional and cognitive growth. Although several pathways by which chaos in the home and early learning and care (ELC) classroom contexts can influence early development have been proposed in the prior research (see Figure 1 for an illustration), they were not tested here. The overarching aims of the present study were two-fold: (1) to examine the relations between children's exposure to chaos within two important early childhood contexts: the home and the early learning and care (ELC) classroom; and (2) to investigate continuity and discontinuity in children's exposure to household and classroom chaos across setting to illustrate *how* children's experiences across context combine to influence development.

Understanding how children's experiences across context interrelate and combine to influence development is particularly critical for children growing up in low-income families as they are more likely to be exposed to a multitude of disadvantages than are their non-poor peers (Dearing, Berry, & Zaslow, 2006). Within the second aim was the specific objective of illustrating how conditions within the home and within the classroom combine to promote or interfere with low-income children's developmental gains over the course of a year of participation in an early intervention preschool program. To do so, data from a large representative sample of low-income children attending Head Start—a federal program for disadvantaged preschool children that includes preschool education, health screenings and examinations, nutritionally adequate

meals, and opportunities to develop social-emotional skills that support school readiness (West et al., 2010)—were analyzed to examine children's exposure chaos in their home and preschool classroom settings. Presumably, chaos within the home environment already had some effect on children's development when they began Head Start. Thus, this study functioned as a test of how children's exposure to household chaos set the stage for children to gain more or less over the preschool year and how children's exposure to chaos in their preschool classrooms affected that change.

A systematic examination of chaos proceeded in three phases which began first with identifying the environmental characteristics central to chaos based on the prior research of indicators and indices of chaos within both contexts and available data. Second, the identified environmental characteristics were combined into two cumulative indices, one that represented chaos within the home and another that represented chaos within the classroom. Third and finally, the levels of chaos children experienced within the home and within the classroom were combined into a chaos profile that represented children's exposure to high and/or low levels of chaos in each setting.

Two types of hypotheses were examined regarding how children's exposure to chaos across context might combine. Main effect hypotheses predicted that children's social-emotional and cognitive growth would be adversely influenced by exposure to high levels of chaos within each context. Interaction effect hypotheses predicted that the level of chaos in one context would interact with the level of chaos in the other to influence social-emotional and cognitive growth over the preschool year. Children were exposed to either similar levels of chaos in each setting (continuity) or varying levels of chaos in each setting (discontinuity). One set of interaction hypotheses was developed based on children's experiences of continuity across setting and another set was developed based on children's experiences of discontinuity across setting. For children

who experienced similarly high or low levels of chaos in each setting, the effect of chaos was predicted to cumulate across setting to either interfere or promote children's development, respectively. For children who experienced high levels of chaos in one setting and low levels of chaos in the other, chaos was predicted to have either a compensatory or lost resources function on development.

The compensatory function would be evident if exposure to a non-chaotic preschool environment could compensate for the negative consequences associated with a chaotic home environment. The lost resources function would be evident if exposure to a chaotic preschool environment negated the positive benefits associated with a non-chaotic home environment. Findings from the child care literature, which highlight the home environment as a stronger influence on children's development than the child care context, suggests that for children from chaotic home environments, a non-chaotic preschool classroom may not be able to compensate for the negative home environment, thus tempering children's ability to benefit from the preschool year. The salience of the home environment also suggests however, that for children from non-chaotic home environments, exposure to high levels of chaos in the preschool classroom may not have adverse consequences for their growth over the preschool year.

Chapter IV. Method

Because low-income children are at an increased risk for being exposed to multiple disadvantages and at an increased risk for being exposed to chaotic experiences, a central advantage to this study was the ability to take advantage of a large, nationally representative sample of low-income children attending Head Start. The benefits of studying children's exposure to chaos within a sample of low-income children attending Head Start were two-fold: (1) the reduced variation in SES helped disentangle the influence of chaos from the influence of SES on children's development, which provided additional confidence that any significant findings could be attributed to the effect of chaos and not SES; and (2) the investigation of how exposure to household and classroom combined to influence children's growth allowed for policy-relevant conclusions about what factors might promote or interfere with low-income children's developmental gains over a year of preschool education.

DATA

Data came from the Head Start Family and Child Experiences Survey: 2006 Cohort (FACES 2006), which is the fourth in a series of national cohort studies designed to examine Head Start's effectiveness in increasing school readiness among children from low-income families. FACES 2006 was designed to follow children from their first (and possibly only) year of Head Start through kindergarten. Two cohorts of children were represented in FACES 2006: (1) A younger cohort of children who were age 3 when they entered their first year of Head Start in the fall of 2006 and may have attended an additional year of Head Start prior to Kindergarten entry and (2) An older cohort of children who were age 4 when they entered their first and only year of Head Start in the fall of 2006.

Head Start children and families were randomly selected using a four-stage sample design: 1) Head Start programs; (2) centers within programs; (3) classrooms within centers; and (4) children within classrooms. Here, Head Start "programs" are the grantees or delegate agencies that have been awarded funding for the purpose of operating Head Start programs at the community level. Grantees can include local public agencies, private nonprofit and for-profit organizations, Indian Tribes, and school systems (ECLKC, 2013). In Head Start preschool programs, the majority of services (96 percent) are offered in center-based settings with variation in how many days per week and how many hours per day classes within those centers are in session (ECLKC, 2013).

Stratification was used at each stage of selection to control the representativeness of the sample and to oversample three-year-olds. FACES 2006 oversampled three-year-olds to compensate for the attrition that had occurred in prior cohorts during the extra year of follow-up. A total of 4,051 children and their families were initially selected from approximately 410 classrooms within 135 centers within 60 Head Start programs across the country. Nearly 3,200 of these children and their families actually participated in FACES 2006 in the fall of 2006 and nearly 1,900 children and families were still participating in their kindergarten year (spring 2008 for the four-year-old cohort, spring 2009 for the three-year-old cohort).

Analysis Sample and Sub-Samples

In the current study, data from two rounds of data collection, fall (2006) and spring (2007) of children's first Head Start year, for both cohorts of children were analyzed to study children's social-emotional and cognitive growth over the preschool year. A summary of the data collection is presented in Table 1.

The sample was first limited to children who remained in the same Head Start classroom in both the fall and in the spring. Though it might be argued that switching classrooms in the middle of the school year constitutes a chaotic experience, one of the goals of the study was to examine children's experiences of chaos within their classroom environments. Excluding children who switched classrooms ensured that the sample only included children who were exposed to the same classroom environment, and arguably, the same chaotic classroom experiences, over the course of the school year. Approximately 133 children switched classroom between the fall and spring. The full analysis sample included 2,447 children, of whom 1,484 children were age 3 in the fall of 2006 and 963 children were age 4.

In order to accurately assess children's cognitive gains over the school year, the sample for analyses examining children's cognitive outcomes was further limited to children who were assessed in English in both the fall and spring, and thus were all assessed using the same cognitive assessments in the same language in both the fall and spring. Approximately 200 children were assessed in Spanish in the fall and then in English in the spring and another 200 children were assessed in Spanish in both the fall and spring. The cognitive analysis sample included 2,067 children, of whom 1,212 children were age 3 and 855 were age 4 in the fall of 2006.

In analyses classifying children into profiles based on their exposure to chaos across settings, the sample was limited to children who fell into one of the five chaos profiles. Approximately half of the original sample of children fell into one of the five profiles (N=1292), of whom 784 were age 3 and 508 were age 4 in the fall of 2006. For analyses examining children's cognitive outcomes, this sample was further restricted to children assessed in English in both the spring and fall. The resulting sample included 1,081 children, of which 636 children were age 3 and 445 children were age 4.

Descriptive characteristics of the four analysis samples are presented in Table 2. In general, each of the four analysis samples had similar demographic characteristics. In each sample approximately half the children were male and a third was Black. More than half lived in poverty and lived in families using multiple forms of public assistance. Almost two-thirds of children had mothers who had a high school diploma or higher. There were a few notable differences between the cognitive analysis samples and the full analysis samples. As might be expected, the cognitive analysis samples, made up only of children who were assessed in English in the fall and spring, included fewer Hispanic children, more children from households where the primary language was English, and fewer children in classrooms with teachers of Spanish, Hispanic, or Latino origin.

Data from both age cohorts of children were examined in the same analyses, but all analyses included controls for cohort to account for potential developmental differences between children who were age 3 and who were age 4. Examining each cohort separately in all of the analyses would have resulted in restricted sample sizes that would have potentially limited the ability for significant findings to emerge—this was particularly true in the models where children's chaos profiles were the predictor of development. Separate examinations of cohort would have also doubled the number of analyses, which would have increased the likelihood of Type I errors. In the interest of validity, children in both cohorts were examined together except in analyses where cohort was analyzed as a moderator.

MEASURES

Data were collected through parent and teacher interviews, teacher and parent reports of children, direct assessments of children, and classroom observations. All of the information presented about the measures used in the present study was reported in the

FACES 2006 User Manual (West et al., 2010). Six indicators of household chaos and six indicators of classroom chaos were derived from data collected either in the fall (2006) or spring (2007) of children's Head Start year. Indicators were selected based on the availability of data and based on their face validity as indicators of disorder or turbulence/instability in each setting. The indicators of household chaos were collected through parent-report while the indicators of classroom chaos were collected through parent-report, teacher-report, and observation. Classroom observations occurred in the spring of the Head Start year. Continuous variables were transformed into indicator variables representing the presence of chaos (0=no chaos, 1=chaos). The criteria used to evaluate when chaos was present for each indicator is detailed below.

Each of the measures of children's social-emotional and cognitive development was assessed in both the fall and spring. All of the covariates were assessed in the fall.

Indicators of Chaos in the Home

Household Size (Crowding)

Measures of crowding typically take into account the number of rooms in a household, but this information was unavailable in the data; therefore, household size was used. A complete roster of all household members (adults and children), including age, gender, and relationship to the child was collected in the fall of the Head Start year. One can expect that the greater the number of people in a household, the greater the degree to which a house feels crowded. Because research has shown that the presence of additional children presents a unique source of competition for resources that is important for understanding the influence of crowding on children's development, the number of adults and the number of children were considered as separate indicators of chaos instead of using a total number of household members.

Number of adults. The number of adults within the home variable was recoded to indicate chaos if a child lived in a household with more than 3 adults at the time of entry into Head Start (Fall 2006). One standard deviation above the mean was equal to 2.91 and nearly 13 percent of the sample lived in households with 3 adults whereas just 5 percent lived in households with 4 adults, representing a clear break in the distribution.

Number of children. The number of children within the home variable was recoded to indicate chaos if a child lived in a household with more than 4 children. One standard deviation above the mean was equal to 3.82. More than 13 percent of the sample lived in households with 4 children, but fewer than 5 percent lived in households with 5 children, again representing a clear break in the distribution.

Lack of Routines

In the spring of the Head Start year, parents reported whether or not they had rules and routines for certain household activities including bedtimes and meals. Parents reported whether or not the child had a regular bedtime for at least 4 days in the past week and how many days in the past week the family had eaten dinner together. The variable representing regularity of bedtimes was dichotomous—parents responded that children either did or did not have a regular bedtime for at least 4 days. Chaos was indicated when parents responded that their child did not have a regular bedtime. The variable representing regularity of family mealtimes was continuous and was recoded to indicate chaos if parents reported the family ate dinner together fewer than 3 days a week. One standard deviation below the mean was equal to 3.54, but the frequency distribution showed a break in the distribution after 3 days. Almost 13 percent of the sample lived in households where the family ate dinner together 3 days a week whereas just over 5 percent lived in households that ate together 2 days a week.

Instability

Parents reported the number of times the family had moved in the prior year as well as the number and type of partners present in the household in both the fall and spring of the Head Start year. Both residential and family instability were examined as indicators of chaos within the home.

Family instability. Family structure was originally coded as biological/adoptive mother and father; biological/adoptive mother only; biological/adoptive father only; non-biological mother and father; step-mother and biological/adoptive father; biological/adoptive mother and step-father; biological grandparents; or other. Four dummy-coded variables were created to indicate a two-biological/adoptive-parent family, a single-biological/adoptive parent (mother or father) family, a two-parent family with only one biological/adoptive parent, or other. Only a very small percentage of children (approximately 1.5%) experienced a change in their family structure from the fall to spring making it impossible to examine experiencing a change in family structure over the Head Start year as an indicator of instability. As an alternative, chaos was indicated if a child was not residing with both their biological/adoptive parents at the time of Head Start entry.

Residential instability. To gain a better understanding of children's residential instability, the number of times a child moved in the year prior to Head Start and the number of times a child moved during the Head Start year were summed to assess how many times the child had moved in the past two years. The variable representing the number of moves was recoded to indicate chaos if parents reported having moved 2 or more times in the previous 24 months. One standard deviation above the mean was equal to 1.94 and the frequency distribution showed a break in the distribution between 1 and 2

moves. Approximately a quarter of the sample moved once in the previous 24 months whereas just over 11 percent moved twice.

Indicators of Chaos Risk in the Classroom

Group Size (Crowding)

Neither the size of the physical classroom nor the number of toys/materials within the classroom were available so two alternative measures of crowding were examined—the child-teacher ratio and the class group size (the number of children in the classroom). The number of children and adults in the classroom were assessed through teacher-report and through observations. The teacher-reported counts of children were used in the present analyses because there was less missing data in the teacher-reports than in the observed counts and clearer breaks in the distribution were available in the teacher-reports, which helped define the at what point in the distribution risk was present.

Child-teacher ratio. The greater the number of children per adult in the classroom, the less the teacher is able to give a child individual attention, prevent negative behavior or create opportunities for learning, all of which are symptomatic of crowded environments (West et al., 2010). The child-teacher ratio variable was recoded to indicate chaos if the child-teacher ratio was greater than or equal to 11. One standard deviation above the mean was equal to 11.8 and there was a marked break in the frequency distribution between 10 and 11. Approximately 18 percent of the sample were in classrooms with a child/teacher ratio of 10 while less than 1 percent were in classrooms with a ratio of 10.5.

Number of children. The number of children in the classroom variable was recoded to indicate chaos if the teacher-reported number of children in the classroom was greater than 20 children. One standard deviation above the mean was equal to 19.92 and

there was a clear break in the frequency distribution between class sizes of 20 and 21. Just over 20 percent of the sample were in classrooms with 20 children while just fewer than 2 percent were in classroom with 21 children.

Lack of Routine

No explicit measure of the degree to which there was routine within the Head Start classroom was available. Teachers reported whether or not they used a daily plan, but there was no variability in the measure as almost every teacher reported using a daily plan (M = 0.99, SD = 0.07). A measure of the degree to which there was structure in the classroom, assessed in the spring, was used instead. The program structure subscale of the Early Childhood Environment Rating Scale-Revised (ECERS-R; Harms et al., 2005) consisted of 4 items: space for privacy, schedule, free play, and group time. Items within each subscale were rated by trained observers on a scale from 1 ("inadequate") to 7 ("excellent") and then averaged to create a subscale mean.

The variable representing classroom scores on the Program Structure subscale was recoded to indicate chaos if the score was equal to or below 2.75. One standard deviation below the mean was equal to 2.89 and there was an indication of a break in the frequency distribution between 2.75 and 3.0. Almost 8 percent of children were in classrooms with Program Structure subscale scores of 3.0 whereas fewer than 3 percent of children were in classrooms with Program Structure subscale scores less than 2.75.

Instability

Children's experiences of instability in the classroom were assessed in three ways—arrangement multiplicity (the total number of child care arrangements children experienced), the number of days out of the school year the child was absent, and whether or not the child experienced a teacher change in the middle of the school year.

Arrangement multiplicity (number of child care arrangements). In the spring, parents reported the number of child care settings in addition to their Head Start classroom, a child experienced over the year. The greater the number of different child care settings, the greater the setting instability. The variable representing the number of child care arrangements was recoded to indicate chaos if the number of arrangements was equal to or greater than 2. Approximately a third of the sample had one other child care arrangement in addition to Head Start while just less than 8 percent had two other child care arrangements. One standard deviation above the mean was equal to 1.4.

Number of absences. Teachers reported the number of days the child was absent from the classroom. The number of absences variable was recoded to indicate chaos if the number of days a child was absent from the classroom was equal to or greater than 14. One standard deviation above the mean was equal to 13.82. It was difficult to determine a clear break in the frequency distribution, but approximately 10 percent of the sample missed 14 or more days.

Teacher change. A variable indicating chaos was created if children experienced a change in their teacher between the fall and spring of the Head Start year. Because children who switched classrooms were excluded from the analytic sample, children who experienced a teacher change remained in the same classroom. This allows for greater confidence that the teacher change was because the teacher left the classroom and not that the child left the classroom, which might occur for any number of reasons including behavior problems or learning challenges that might covary with children's social-emotional and cognitive growth.

Children's Social and Cognitive Development

Measures of children's social-emotional development were reported by both their teachers and parents in the fall and spring of the Head Start year. Measures of children's cognitive development came from direct assessments in both the fall and spring. Assessments of children's social-emotional and cognitive development in the fall were included in all of the analyses predicting children's social-emotional and cognitive development in the spring so that the chaos variables were predicting children's gains over the Head Start year. Reliability estimates from each of the standardized measures used in the study were presented in the FACES-2006 user manual and the alphas are reported below (West et al., 2010).

Social-Emotional Measures: Behavior Problems and Social Skills

Both parents and teachers reported on children's behavior problems and social skills in the fall and spring of the Head Start year. Assuming that parents reported on children's social-emotional skills based on their children's behaviors within the home and teachers reported on children's social-emotional skills based on their behaviors within the classroom then for the purposes of this study, parent-reported behaviors represent children's behavior in the home and teacher-reported behaviors represent children's behavior in the classroom.

Teacher Reports. Head Start teachers rated the frequency of children's negative classroom behaviors including aggressive, hyperactive, and anxious or depressed/withdrawn behavior using the FACES 2006 Behavior Problems scale. The 14 items for the scale were drawn from the Personal Maturity Scale and the Behavior Problems Index (BPI; Peterson & Zill, 1986). The BPI included undercontrol (e.g., aggression, hyperactivity, and destructiveness) and overcontrol (e.g., social withdrawal,

depression, and somatic problems). A summary score was derived with higher scores representing more frequent or severe negative behavior.

Head Start teachers also rated how often children engaged in cooperative classroom behaviors including following teacher directions, helping to put things away, complimenting classmates, and following rules when playing games. The 12-item scale was drawn from the Personal Maturity Scale and the Social Skills Rating System (SSRS) (Gresham & Elliot, 1990; Elliot et al., 1998). Teachers indicated the extent to which a given statement (e.g., "follows the teacher's directions") was characteristic of the child, from 1 ("never') to 3 ("very often"). A summary score was created with high scores indicating a high frequency of cooperative behavior. The full Personal Maturity Scale, which measures a child's interest or participation, cooperation or compliance, and attention span or restlessness, has internal consistency reliabilities that range from 0.74 to 0.85 across three subscales. The SSRS social skills subscale has an internal consistency reliability of 0.94.

Parent Reports. Parents responded to 21 items taken from the Personal Maturity Scale, SSRS (Gresham and Elliot, 1990; Elliot et al., 1998), and the BPI (Peterson & Zill, 1986) indicating whether a particular statement (e.g., "makes friends easily") was characteristic of the child from 1 ("not true) to 3 ("very true or often true"). The items were categorized into one of two summary scores: social skills/positive approaches to learning and problem behaviors.

Cognitive Measures

Children's gains in cognitive development over the preschool year were assessed using four measures of children's development in the fall of the preschool year (fall 2006) and in the following spring (spring 2007). Gains in cognitive development were

measured by controlling for children's scores on the cognitive assessment in the fall in models predicting the scores on the cognitive assessment in the spring. W-scores were used for each cognitive assessment. W-scores allow for measurement of change or growth in performance on the same scale over time. Changes in W-scores across waves indicate that the child is progressing developmentally and their skills are increasing in absolute terms (West et al., 2010).

Peabody Picture Vocabulary Test-Fourth Edition. The Peabody Picture Vocabulary Test-Fourth Edition (PPVT-4; Dunn et al., 2006) was used to evaluate children's receptive vocabulary. Children were asked to say or indicate, by pointing, which of four pictures best showed the meaning of a word said aloud by the assessor. A series of words were presented, ranging from easy to difficult for children of a given age. When children responded to several items in a set incorrectly, the test ended. The internal consistency reliability (alpha) coefficient in the fall was 0.97 and in the spring was 0.95 (West et al., 2010).

Woodcock-Johnson Tests of Achievement-Third Edition. Three subtests from the Woodcock-Johnson Tests of Achievement-Third Edition (WJ-III; Woodcock et al., 2001; 2004) were used to assess children's cognitive development. Each test ended after three consecutive incorrect items. The Letter-Word Identification subtest measured children's skills in identifying isolated letters and words. The internal consistency reliability for the Letter-Word subtest was 0.81 in the fall and 0.86 in the spring. The Applied Problems subtest measured children's skills in analyzing and solving practical problems in mathematics. The internal consistency reliability was 0.88 in the fall and 0.87 in the spring. The Spelling subtest measured fine motor coordination, pre-writing skills, and children's skills in providing written responses. Internal consistency was 0.79 in the fall and 0.81 in the spring.

Child, Family, and Teacher Covariates

Information on child and family demographics collected during the parent interview in the fall of the Head Start year were included in all of the present analyses as control variables. Child covariates included gender, race and ethnicity (which parents reported separately and thus, are not mutually exclusive), cohort, disability status, and whether the child was born with low birth weight (i.e., weighed less than 5 pounds 8 ounces at birth). Family covariates included whether the household (based on household size) was below the poverty threshold (based on 2005 thresholds), used multiple forms of public assistance (e.g., welfare, food stamps, or WIC), whether the primary language spoken in the house was English, parent education (high school diploma or higher), whether the parents were working full-time and the level of parental depression.

The teacher covariates included in the analyses were also collected during the fall of 2006. Teacher covariates included whether the child's Head Start teacher had a bachelor's degree or higher, whether the teacher had a Child Development Associate (CDA) credential, the teacher's race and ethnicity, the number of years the child's teacher had been teaching in a Head Start classroom and the number of depressive symptoms experienced by the child's teacher.

MISSING DATA

There was a relatively high participation rate at each time point of data collection. Among the 60 Head Start programs that agreed to participate, there was an unweighted response rate of more than 95 percent, and a weighted rate (weighted by sampling weight, the inverse of selection probability), of about 92 percent. Some teachers taught two half-day sessions and ended up with both of their classes being selected for the sample. Among the 368 teachers associated with 410 classrooms, teacher interviews were

obtained for 365 for an unweighted response rate of 99.2 percent and a weighted response of 98.4 percent. Response rates across wave at the child level are presented in Table 3.

Full-information maximum likelihood (FIML) estimation in *Mplus* 6.1 (Muthén & Muthén, 1998-2010) was used to account for missing data. FIML incorporates all available data in the analyses. It does not estimate the missing data points; instead it fits the covariance structure model directly to the observed raw data for each participant (Enders, 2001). FIML assumes that the missing data are either missing completely at random (MCAR) or missing at random (MAR).

To adjust for differential probabilities of selection and to reduce any bias that may have resulted from differential non-response, a child-level sampling weight was constructed for fall 2006 to spring 2007 longitudinal analyses. The longitudinal weight used in the present analyses was defined as follows: "parent interview completed in fall or spring and Teacher Child Report or child assessment completed in fall and spring and teacher interview completed in fall or spring and child's classroom observed" (West et al., 2010; p. 126). Under that definition, 2,501 records had a positive weight.

ANALYTIC METHOD

The present investigation of the associations between children's exposure to chaos within and across context and their subsequent social-emotional and cognitive growth proceeded in several phases of analysis. The first set of analyses examined the within-context association between chaos and children's development. Household and classroom chaos were each operationalized in two ways: (1) as individual indicators and (2) as a cumulative index. The second set of analyses examined continuity and discontinuity in children's exposure to chaos across context and the subsequent relation to children's

development. For these analyses, chaos was operationalized as a profile based on the combination of children's exposure to high and/or low levels of chaos in each context.

For each indicator of children's social-emotional or cognitive development measured in the spring, a set of variables was entered into a multi-level regression model that adjusted for sample stratification and weighting and accounted for the nesting of children within classrooms using the CLUSTER function in *Mplus* 6.1. Each analysis controlled for child, family, and teacher characteristics as well as the parallel social-emotional or cognitive score assessed in the fall of their Head Start year. That is, the dependent variable represented developmental change from the first month or two of Head Start in the fall to the following spring.

Within-Context Analyses: Indicators and Indices of Chaos

In the first set of within-context analyses, the six dichotomous indicators of household chaos and the six dichotomous indicators of classroom chaos were entered into a model predicting each assessment of children's social-emotional and cognitive development in the spring. The construction of each dichotomous chaos indicator variable was presented earlier in the *Measures* section.

For the second set of within-context analyses, the six dichotomous indicators of household chaos were summed to create a cumulative index of household chaos and the six indicators of classroom chaos were summed to create a cumulative index of classroom chaos. The index of household chaos and the index of classroom chaos were then entered into a model predicting each of the spring assessments of children's social-emotional and cognitive skills.

The frequencies of the total number of chaos indicators that children were exposed to in each setting are presented in Table 4. No child was exposed to more than

five indicators of chaos in the home or more than four in the classroom. Because so few of the children were exposed to more than two indicators in either setting (5.1% for household chaos and 1.4% for classroom chaos), both the household and classroom chaos indices were top coded at 2 indicators. Analyses were also run with the indices top-coded at 3 risks and similar results emerged. Only the results from analyses with the indices top-coded at 2 are presented in the interest of interpretability.

As shown in Table 4 children were more likely to experience risk in their home environments than in their classroom environments. Approximately a third of children experienced no chaos in their home environments, just over 40 percent experienced one risk in their homes, and the remaining 20 percent experienced two or more risks. Over half of children experienced no risk in their classroom environments, approximately a third experienced one risk and fewer than 10 percent experienced two or more risks.

Cross-Context Analyses: Chaos Profiles

To examine continuity and discontinuity in children's exposure to chaos across their home and classroom settings, children were classified into chaos profiles based on their scores on the household and classroom chaos indices. Scores of 0 on the chaos index represented no exposure to chaos, scores of 1 represented medium exposure, and scores of 2 represented high exposure. For ease of comparison and following a recently used method (Watamura et al., 2011), the across-context analyses included only children who were exposed to a combination of the extreme levels of chaos across their home and classroom contexts—high chaos in both (Double Jeopardy), no chaos in either (Double Protection), or high chaos in one and no chaos in the other (Compensatory Care and Lost Resources) along with one additional group of children who were exposed to medium levels in both settings (Medium Chaos). An illustration of children's classifications into

the chaos profiles is presented in Figure 2. The frequency distributions for each chaos profile are presented in Table 5.

Generalizability

As suggested in some of the prior research, exposure to chaotic environments may not affect all children the same. To test the extent to which this might be true in the present study, additional analyses examined whether the associations between chaos and both social-emotional and cognitive growth generalized to all children in the sample regardless of their age (whether children entered Head Start when they were age 3 or age 4), gender, or race/ethnicity.

Chapter V. Results

The results from descriptive analyses are presented first. Next, the results from multi-level regression analyses are presented first for the within-context analyses in which the individual indicators of household and classroom chaos and then the cumulative household and classroom chaos indices were predictors of children's growth. Finally, the cross-context analyses in which children's classification into a chaos profile based on their exposure to chaos in each setting were predictors of children's growth are presented.

Descriptive Analyses of Children's Exposure to Chaos

Descriptive statistics for each of the variables that were transformed into indicators of chaos and the frequencies with which children were exposed to each of the indicators of chaos are presented in Table 6. Few bedtime routines, high residential mobility, and not living with both of their biological or adoptive parents were the most common indicators of chaos children were exposed to in the home. Similar proportions of children—ranging between just over 5 percent to just fewer than 10 percent—lived in homes with high numbers of adults and children and experienced few mealtime routines. In the classroom, exposure to low levels of program structure, a high number of child care arrangements, a high number of absences, and a teacher change in the middle of the school year were the most common. Very few children (2.6%) were exposed to classrooms where the number of children exceeded 20. Only a slightly higher percentage (7.5%) experienced child-teacher ratios greater than 11.

Correlations between the household and classroom chaos indicators, indices and profiles and each of the indicators of children's social and cognitive development are presented in Table 7. Two preliminary trends emerged: (1) more of the correlations

between household chaos and children's development reached significance compared to the correlations between classroom chaos and development and (2) more of the correlations between chaos (household or classroom) and children's social-emotional development reached significance compared to the correlations between chaos and cognitive development.

Several of the child, family, and teacher characteristics that were controlled for in the analyses presented below were also related to children's social-emotional and cognitive growth. The most consistent findings were that boys and children in the younger cohort (those who were age 3 at Head Start entry) showed less growth in social-emotional and cognitive skills than did girls and children in the older cohort (age 4 at Head Start entry), respectively. Children in families in which English was the household language, both parents had a high school diploma or higher, and parents reported low levels of depression showed fewer problem behaviors over the preschool year than did other children. Children in classrooms in which the primary teacher was of Spanish, Hispanic, or Latino origin and had a longer history teaching Head Start showed fewer teacher-reported behavior problems over the preschool year than did other children. Very few of the family and teacher characteristics were related to children's gains in social skills. Being Black, Hispanic, having a disability, being born low birth weight and living in poverty were associated with smaller gains in cognitive development while living in an English-speaking household and parent education were related to greater gains in cognitive development. None of the teacher demographics were consistent predictors of children's cognitive development.

Individual Chaos Indicators as Predictors of Child Outcomes

The first aim of the study was to examine how children's exposure to chaos within their home and early learning and care settings predicted their development over a year of preschool. The relations between chaos and children's development were examined first using individual indicators of chaos as predictors. Each of the six home chaos indicators and the six classroom chaos indicators were entered into multi-level regression models predicting gains in children's cognitive and social-emotional development over the preschool year.

Social-Emotional Development: Problem Behavior

Chaotic homes and classrooms were associated with less improvement in children's problem behaviors over the preschool year. The results are shown in Table 8. Three indicators of household chaos, lack of bedtime routines, residential mobility, and not living with both biological/adoptive parents and one indicator of classroom chaos, frequent absences, were significant predictors of problem behaviors. Compared to children who were not exposed to chaos, a lack of bedtime routines or high residential mobility predicted higher levels of problem behavior in the home, $\beta = 0.07$, $p < .01$ and $\beta = 0.05$, $p < .01$, respectively. Not living with both biological/adoptive parents was associated with higher levels of problem behavior in the classroom, $\beta = 0.05$, $p < .05$. Frequent absences from the classroom were associated with problem behaviors in the home, $\beta = 0.04$, $p < .01$ and in the classroom, $\beta = 0.04$, $p < .05$.

Social-Emotional Development: Social Skills

As shown in Table 8, aspects of both home and classroom chaos predicted parent-reported social skills, but none predicted teacher-reported social skills. Two indicators of household chaos, lack of bedtime routines and residential mobility and two indicators of

classroom chaos, a high number of child care arrangements and frequent classroom absences, were significant predictors of social skills. Children who experienced few bedtime routines, β = -0.06, p < .01, high residential mobility, β = -0.04, p < .05, high numbers of child care arrangements, β = -0.04, p < .05, or frequent classroom absences, β = -0.04, p < .05 were reported by their parents to have fewer social skills compared to children with fewer of these chaotic experiences. That is, children in more chaotic environment showed less improvement in social skills over the year in Head Start than did those in less chaotic environments

Cognitive Development

As shown in Table 9, three aspects of household chaos and three aspects of classroom chaos were associated with poorer cognitive development in young children. Few bedtime routines predicted less growth in applied problem skills, β = -0.05, p < .05. High residential mobility predicted less growth in applied problem skills, β = -0.05, p < .01, and spelling skills, β = -0.04, p < .01. Not living with both biological/adoptive parents predicted less growth in vocabulary skills, β = -0.05, p < .05. In the classroom, large group size predicted less growth in vocabulary skills, β = -0.17, p < .01. Other aspects of classroom chaos—a high child/teacher ratio, β = 0.17, p < .05, and little observed program structure, β = 0.22, p < .05, predicted more improvement in letter-word recognition and spelling skills, respectively.

Cumulative Chaos Indices as Predictors of Development

The relations between chaos and children's development within context were next analyzed using a cumulative index of chaos in each setting as predictors. As shown in Table 10, home environments that were high on the cumulative household chaos index predicted less improvement in children's problem behavior, β = 0.07, p < .01, or social

skills, β = -0.07, p < .01, compared to less chaotic homes. Compared to less chaotic classrooms, classroom environments that were high on the cumulative classroom chaos index predicted less improvement in children's problem behavior in the home, β = 0.04, p < .01 and in the classroom, β = 0.07, p < .05.

Homes that were high in chaos were related to lower gains in children's applied problem skills, β = 0.04, p < .05 (Table 11). Chaos in the classroom was unrelated to children's cognitive development.

Generalizations across Child Characteristics

Different patterns may emerge in the relations between children's exposure to household or classroom chaos (assessed with the cumulative indices) and their social-emotional and cognitive growth based on important child characteristics. The analyses were re-examined in four additional sets of analyses: (1) the relations were examined separately for children in the younger cohort (age 3 at Head Start entry) and for children in the older cohort (age 4 at Head Start entry); (2) two interaction terms—household chaos*gender and classroom chaos*gender were entered into the models; (3) two interaction terms—household chaos*race and classroom chaos*race were entered into the models; and (4) two interaction terms—household chaos*Hispanic and classroom chaos*Hispanic were entered into the models.

Age. In the sample of only younger children, household chaos did not predict growth in either social-emotional (Table 12) or cognitive skills (Table 14) in younger children. By contrast, classroom chaos predicted less improvement in classroom problem behaviors and social skills (Table 12) but was unrelated to younger children's growth in cognitive skills (Table 14).

In the sample of older children, household chaos predicted less improvement in problem behaviors in the home and fewer gains in social skills in both the home and classroom contexts (Table 13). Classroom chaos predicted less improvement in classroom problem behaviors and social skills and fewer gains in applied problems skills (Table 15).

Gender. Only the interaction between classroom chaos and gender in predictions of children's applied problem skill reached significance, $\beta = 0.06$, $p < .05$. Because of the lack of significant interactions with gender, the results are not presented in a table. For boys, home risk ($\beta = -0.08$, $p < .05$, but not classroom risk (classroom risk was only significant at $p < .06$), was associated with lower applied problems skills. In contrast, neither the level of household nor classroom chaos was significantly associated with girls' scores.

Race/Ethnicity. In analyses testing race and ethnicity as moderators, only three of the relations between the chaos risk indices and children's development were found to vary significantly by children's race or ethnicity. Again, because so few of the interactions reached significance, the results are not presented in a table. Parents reported children's race and ethnicity separately and because they were not mutually exclusive, the samples were grouped separately by race and then by ethnicity. Race emerged as a significant moderator of the associations between chaos and both parent-reported problem behavior, $\beta = -0.05$, $p < .05$, and children's letter-word recognition skills, $\beta = 0.07$, $p < .05$. Neither the home nor classroom risk indices were associated with behavior problems for Black children, $\beta = 0.05$ and $\beta = -0.01$, $p < .05$, but were significantly associated with behavior problems for all other children, $\beta = 0.07$, $p < .01$ and $\beta = 0.08$, $p < .01$, respectively. Classroom risk predicted higher letter-word recognition skills for

Black children, $\beta = 0.07$, $p < .05$, but it was unrelated to letter-word recognition skills for all other children.

Ethnicity was a significant moderator of the association between classroom risk and children's letter-word recognition skills, $\beta = -0.08$, $p < .05$, but when probed further, only a modestly significant association between classroom chaos and the Letter-Word subscale for non-Hispanic children emerged, $\beta = 0.04$, $p < .10$.

Interactions between Cumulative Indices of Household and Classroom Chaos

To determine whether children's exposure to chaos in each setting combined to influence development, an interaction term was created by taking the product of children's scores on the cumulative indices of household chaos and their scores on the cumulative indices of classroom chaos. The interaction term was then entered into models predicting children's social-emotional and cognitive gains. For social-emotional development over the preschool year, though main effects of household and classroom chaos were present for both problem behaviors and social skills, the interaction between household and classroom chaos was significant only for children's gains in parent-reported social skills (Table 16). As shown in Table 17, the interaction term was not a significant predictor of any of the indicators of children's cognitive development. The next set of analyses was designed to understand *how* children's exposure to chaos in each setting combined to predict development.

Chaos Profiles as Predictors of Development

The second aim of the study was to test how continuity or discontinuity in children's exposure to chaos across their home and classroom environments might combine to influence their social-emotional and cognitive growth. To do so, children were categorized into profiles based on their exposure to either no or high levels of chaos

in each context (Figure 2). These profiles were used to predict children's social-emotional and cognitive growth over the preschool year. The analyses were run first with the Medium Chaos group (a chaos index score of 1 in both the home and classroom) as the reference group. To fully understand how combinations of exposure to varying levels of chaos compared with one another, two additional chaos profiles—the Double Protection (a chaos index score of 0 in both settings) and the Compensatory Care (a chaos index score of 2 in the home and 0 in the classroom)—were selected as reasonable reference (i.e., omitted) groups based on sample size.

Children in the Double Protection profile (no risk for chaos in either the home or the classroom) demonstrated the greatest gains in social-emotional and cognitive development overall. As shown in Table 18, being in the Double Protection group predicted greater improvement in problem behaviors and greater gains in social skills within the home than did children in the Medium Chaos group. As shown in Table 19, being in the Double Protection group predicted greater gains in social-emotional skills than being in the Double Jeopardy, Compensatory Care or Medium Chaos groups. Children in the Double Protection group also made greater gains in spelling skills than did children in the Compensatory Care group. That is, children who were not exposed to chaos in either context fared better than children who were exposed to more chaotic homes, regardless of whether their classroom setting was also chaotic (Double Jeopardy and Medium Chaos) or absent of chaos (Compensatory Care).

That a home context absent of chaos was beneficial for children's development over the preschool year regardless of the level of chaos in the classroom was supported across the models with varying groups as the reference group. As shown in Table 19, there was no difference in social-emotional gains between children in the Double Protection profile and children in the Lost Resources profile, the latter of whom were

exposed to a similar absence of chaos in the home, but also were exposed to high levels of classroom chaos. Additionally, as shown in Table 20, children in the Compensatory Care profile showed less improvement in problem behaviors compared to children in either the Double Protection or Medium Chaos profiles. Children in both the Double Protection and Medium Chaos profiles were exposed to lower levels of chaos in the home and classrooms that were either similarly non-chaotic (Double Protection) or more chaotic (Medium Chaos)

Developmental Differences

The salience of the home environment relative to the classroom environment in predicting children's developmental gains may vary according to children's age. Older children have had more years of exposure to the home environment than have younger children. Thus, the home environment may be more salient for their growth compared to younger children.

To examine whether there were any different patterns for younger versus older children, analyses predicting social-emotional and cognitive gains from children's chaos profiles were run separately for children who entered Head Start at age 3 and for children who entered at age 4. These analyses did not test for a significant interaction between children's exposure to chaos across context and age, rather these analyses sought to illuminate any patterns in the relations between exposure to varying levels of chaos across context and children's growth within each cohort of children.

The results of these analyses show that exposure to multiple non-chaotic contexts was beneficial for development in each cohort of children. When children were exposed to varying levels of chaos across settings, the results revealed a pattern for the younger children which indicated that the classroom environment relative to the home

environment may be the most salient. The results reveal the opposite pattern for older children—the influence of the home environment was more salient relative to the classroom environment for their development over the preschool year.

Younger Children (Age 3 at Head Start Entry). As shown in Table 21, younger children in the Double Protection group made greater social-emotional gains in the home than did children in the Medium Chaos group and as shown in Table 23, younger children in the Double Protection group also made greater social-emotional gains in the home than did children in either the Double Jeopardy or Compensatory Care groups. Double Protection children also made greater gains in social-emotional development and spelling skills in the classroom than did Lost Resources children.

Younger children in the Lost Resources group made smaller improvements in classroom problem behavior than did children in the Medium Chaos group (Table 21). Children in the Lost Resources group were exposed to lower levels of chaos in the home, but higher levels of chaos in the classroom than were children in the Medium Chaos group. That is, the protective nature of children's non-chaotic homes was lost to the chaos in the classroom, but specifically for predictions of younger children's behavior in the classroom.

Compared to younger children in the Compensatory Care group, children in the Double Jeopardy group made greater gains in social skills in the classroom while children in the Lost Resources group showed less improvement in classroom problem behaviors (Table 25). Children in both the Double Jeopardy and Lost Resources groups were exposed to higher levels of classroom chaos than were children in the Compensatory Care group, but only the Lost Resources group showed less improvement. For children in the Lost Resources group, the protective nature of a non-chaotic home was again lost to the influence of chaos in the classroom, but only for predictions of classroom behavior.

Older Children (Age 4 at Head Start Entry). As shown in Table 22, compared to the Medium Chaos group, older children in the Double Protection group made greater improvements in problem behaviors in the home but older children in the Compensatory Care group made smaller gains in social skills and applied problems skills. Children in both the Double Protection and Compensatory Care groups were exposed to lower levels of classroom chaos than the Middle Chaos group, but only when the absence of classroom chaos was combined with the absence of household chaos was it protective (Double Protection). For children in the Compensatory Care group, the lower levels of classroom chaos did not compensate for the high levels of chaos in the home.

As shown in Table 24, older children who were in the Double Protection group showed greater growth in social-emotional skills in the home compared to children in both the Double Jeopardy and Compensatory Care groups. Double Protection children also made greater gains in letter-word recognition skills. As shown in Table 26, compared to older children in the Compensatory Care group, children in the Double Protection group showed greater improvement in both classroom and home behavior problems and in social skills in the home. Children in the Medium Chaos group showed greater improvements in problem behaviors within the home than did children in the Compensatory Care group. Again, for older children who were in the Compensatory Care, the lower levels of chaos in the classroom could not compensate for the high levels of household chaos.

Chapter VI: Discussion

The primary goals of the present study were to examine the relations between children's exposure to chaos within two important early childhood contexts—the home and the early learning and care (ELC) classroom, and to investigate continuity and discontinuity in children's exposure to chaos across setting to illustrate *how* children's experiences across context combine to influence development. Early childhood, a critical period of development for establishing a foundation to support later development and well-being, is increasingly likely to take place in multiple contexts. The degree to which each context promotes healthy development is likely to vary, and these experiences can work together or against each other to influence development (Bradley, 2010; Bronfenbrenner & Morris, 1998).

In this study, children's exposure to chaotic environments was examined specifically (Bronfenbrenner, 1999; Evans, Gonnella, Marcynszyn, Gentile, & Salpekar, 2005). Chaos has only recently received attention from researchers as a complex influence on development that describes the nature and consequences of a system of overly stimulating and disruptive environmental characteristics (Wachs & Evans, 2010). Research has consistently shown that predictable, calm, and organized environments are associated with better social-emotional and cognitive development. In contrast, chaotic environments—those characterized by a pattern of frenetic activity, lack of structure, unpredictability in everyday activities, and high levels of ambient stimulation—are consistently associated with poorer developmental outcomes. Because children in early childhood cannot do as much seeking out and niche-building as older children (Scarr & McCartney, 1983), they may be particularly susceptible to the negative consequences of chaotic environments.

The major findings of this study confirm the importance of chaos as an influence on children's social-emotional and cognitive development within their home and early learning and care contexts and also highlight the importance of studying cross-context influences on development. By taking advantage of a large sample of low-income children attending Head Start, the results of this study specifically highlight what conditions promote or interfere with the ability for low-income children to profit from a year of preschool education.

Bringing Order out of Chaos

Prior examinations of chaos have ranged from individual indicators of chaos that cut across disorder and turbulence/instability within a particular setting, an index created from a parent report measure called the Confusion, Hubbub, and Order Scale (CHAOS; Matheny et al., 1995) that focuses mostly on disorder, to a variety of within-setting indices made up any number of chaos indicators (Ackerman et al., 1999b; Brown & Low, 2008). Recently though, there has been some consensus among researchers that two driving constructs defining a chaotic environment are disorder and instability/turbulence (Brooks-Gunn, Johnson, & Leventhal, 2010; Vernon-Feagans et al., 2012). To date, the study of chaos has seemed rather chaotic in and of itself, with no clear conceptual or operational definition to guide researchers. The current study was a systematic examination of different methods of defining chaos that began with individual indicators in the home and classroom settings. From there a cumulative index of chaos based on the same indicators was created for each setting. Finally, the level of chaos children experienced in each context was combined to create a chaos profile for each child.

Because chaos is defined as a *pattern* or a *system* of multiple activities that interfere with development (Bronfenbrenner & Evans, 2000), studying chaos as a

cumulative index or as a profile of experiences across settings is more logical than studying chaos in its individual components. A commonly cited disadvantage to using cumulative indices however is that by using cumulative risk indices researchers assume that child outcomes vary according to the number of factors, not the type of factor (Ackerman et al., 1999a). Thus, the first phase of data analysis in the present study broke chaos down into its individual components and was informative as it provided some insight into what aspects of chaos were particularly risky for different domains of development within different settings. That said, examining chaos as a cumulative index was a more authentic representation of chaos as a pattern or system of disorder and instability/turbulence.

Some researchers argue that there is limited evidence that chaos is a distinct construct from other aspects of family adversity including socioeconomic status (e.g., Ackerman & Brown, 2010; Dumas et al., 2005). A wealth of evidence shows that the association between chaos and children's development remains significant after family socioeconomic status (SES) is accounted for. The present study provides additional evidence supporting chaos as a distinct construct. Not only were the relations between chaos and children's development significant after numerous child, family, and teacher socio-demographic characteristics were controlled, but considerable variability in the likelihood of experiencing chaos was present in this study in which all of the children were from low-income families. If chaos were just another indicator of low SES, then one would expect minimal variability in chaos within a sample of low-income children.

Empirically, this study showed that chaos predicts children's development over and above indicators of socioeconomic status, but it also shed light on what chaos adds conceptually to our understanding of children's development. Chaos disrupts and interferes with children's ability to depend on and use the available resources in their

environment, whether the resources are few as might be the case in low-income families, or many as might be the case in higher-income families. Here, chaos was conceptualized as a system or pattern of environmental characteristics that interfere with the consistent and predictable interactions between children and their environments that are central to development. The findings of this study show that in two separate low-income contexts, children's exposure to chaos was disruptive for their development.

Chaos was Not the Norm

The majority of children in this study were not exposed to high levels of chaos in either their home or classroom contexts. This is particularly noteworthy given that all of the children came from low-income families where the probability for low resources and other types of disadvantage is greater than for children from higher-income families. Approximately a third of children had home environments that were absent of chaos and over half had classroom environments that were absent of chaos. For children who were exposed to high levels of chaos, exposure to chaos was not evenly distributed across context—more children experienced high levels of chaos in their home environments than in their classrooms. All of the classrooms in the study were Head Start classrooms and because Head Start is designed and regulated to be a positive environment for low-income children, it follows that chaotic classrooms might be infrequent.

Dual risk across both environments was even less frequent. Very few (less than 5 percent of children) experienced high levels of chaos in both their home and classroom and more than a third of children experienced no chaos in both settings. Given that children were more likely to experience chaos in their home than in their classroom, it was to be expected that more children experienced the combination of chaotic home environments and protective classroom settings than vice versa.

Household and Classroom Chaos and Children's Growth

The first aim of the study was to investigate the relations between children's exposure to chaos *within* their home and early learning and care (ELC) classroom settings and their social-emotional and cognitive development over the preschool year. Children's exposure to high levels of household chaos predicted smaller improvements in their problem behaviors and social skills even with controls for important covariates including child gender, family poverty, and both parent and teacher education and depression compared to children exposed to lower levels of chaos. These findings confirm and extend earlier work finding relations between household chaos and children's social-emotional development (Ackerman et al., 1999b; Coldwell et al., 2006; Dumas et al., 2005). In line with prior research linking chaos to children's cognitive development (Petrill et al., 2004; & Pike et al., 2006), there was some evidence that household chaos predicted smaller gains in children's cognitive skills. Few bedtime routines and high instability predicted less growth in three cognitive skills, and the cumulative index of household chaos was related to less growth in applied problems skills.

Prior studies of chaos have almost entirely been dedicated to household chaos. This study was one of the first attempts to conceptualize chaos in an early learning and care setting. The cumulative index of classroom chaos used in this study predicted smaller gains in children's social-emotional development, which supports the findings in an earlier study in which the CHAOS was adapted for use in an early learning and care setting and was related to children's compliance behaviors (Wachs et al., 2004). Their aggregate measure assessed the disorder dimension of chaos (e.g., crowding, control, and organization). In comparison, the classroom index in this study assessed both disorder and instability. In fact, findings from this study highlight the influence of classroom instability on social-emotional growth and provide less support for the influence of

disorder or routines. When the components of classroom chaos were examined individually and not aggregated into index, classroom instability, namely arrangement multiplicity and frequent absences were consistently related to less social-emotional growth, while neither crowding nor routines predicted social-emotional growth.

Little support was found for the influence of disorder in either context. In the home, crowding was unrelated to either social-emotional or cognitive growth. Some support was found in the classroom, but it was inconsistent. In the classroom, large group size predicted less growth in cognitive skills while exposure to a high child-teacher ratio predicted gains in cognitive skills. That large group size and a high child-teacher ratio had opposite relations to cognitive development is difficult to interpret given that the number of children in the classroom is captured in both indicators, though inconsistencies have been found in other studies of chaos as well. In a recent study of children living in rural low-wealth communities, longitudinal assessments of chaos within the home showed that a "disorganization" factor, which included items such as household density, cleanliness, and noise was negatively associated with children's receptive language (Vernon-Feagans et al., 2012). In contrast, an "instability" factor, which included items such as the number of people in the household, the number of residential moves, and changes in the primary and secondary caregivers, was positively related to children's receptive language.

Though the prior research has established that chaos is related to poor social-emotional *and* cognitive functioning, given the great variability in researchers' conceptualizations and measurements of chaos in prior work on chaos, the true nature of the relations between chaos and children's development remains not fully understood, particularly within contexts outside the home. The results of this study provide stronger support for the link to social-emotional growth compared to cognitive growth. Compared

to growth in cognitive skills, household chaos was more often associated with children's social-emotional skills and classroom chaos was more consistently related to social-emotional skills. Given that there was little support for the influence of the disorder dimension of chaos in either context, but strong support for the influence of the turbulence/instability dimension of chaos, the finding that both household and classroom chaos were better predictors of social-emotional development than cognitive is in line with prior work that also provides strong support for the association between instability and children's social development (Ackerman et al., 2002; Ackerman et al., 1999b; Cavanagh & Huston, 2006; Osborne & McLanahan, 2007).

With only one exception, household chaos was related to smaller gains in social-emotional skills in the home, but not in the classroom, which might suggest that children's exposure to chaos within one context predicts development within that specific chaotic context, but not in other contexts. This is unlikely for a number of reasons: (1) In this study, classroom chaos was related to smaller gains in social-emotional skills in *both* the home and classroom contexts; and (2) Several studies show that children's exposure to aspects of household chaos predicts children's behavior in other contexts (Ackerman et al., 2002; Cavanagh & Huston, 2006; Dumas et al., 2005). Children were more likely to be exposed to chaos in their home environments than they were in their classroom environments, and since parents are also susceptible to the negative influence of chaos, they may be particularly sensitive to their children's problem behaviors and social skills. Parents are also observing the behavior of far fewer children than are teachers, perhaps making it easier for parents to identify social-emotional difficulties. Children from low-income families tend to display poorer social-emotional functioning than their higher-income peers (e.g., Huston & Bentley, 2010; McLoyd, 1998) and since all of the children in Head Start classrooms are from low-income families, Head Start teachers may be

teaching in classrooms where most children are displaying poor social-emotional functioning.

Do all children respond similarly to being exposed to chaotic homes or classrooms? When the relations between chaos and children's social-emotional and cognitive growth were analyzed separately for children in the younger and older cohorts, the same pattern did not emerge for each cohort. In the sample of younger children, although household chaos was unrelated to development, classroom chaos did predict less improvement in social-emotional skills. By contrast, in the sample of older children, both household and classroom chaos predicted poorer functioning. Only a few differences emerged in interactions with gender, race or ethnicity, suggesting that for the most part, the relations between exposure to chaos and poor social-emotional and cognitive development generalize for boys, girls and children of varying race/ethnicity, but there is some suggestion that the relations do not generalize developmentally, at least across context. Older children were vulnerable to both household and classroom chaos, whereas younger children appeared to only be vulnerable to classroom chaos.

Continuity and Discontinuity in Chaos

The second aim of this study was to investigate continuity and discontinuity in children's exposure to chaos across setting to illustrate *how* children's experiences across context combine to influence development. Because the children in the study were all from low-income families and were all in Head Start classrooms, the findings from these analyses are particularly noteworthy in that they allow for conclusions specifically about what conditions promote or interfere with the ability for low-income children to benefit from a year of preschool.

Continuity in children's experiences of chaos across the home and classroom contexts, that is, the degree to which both contexts were similarly chaotic or non-chaotic, was hypothesized to combine to create a cumulative influence on development. The cumulative influence on development is most often studied in the context of risk, which supposes that the accumulation of risk factors influences development such that the greater the number of risk factors, the worse the developmental outcome (Sameroff, 2000; Sameroff et al., 2003). The cumulative hypothesis was supported both for children who experienced high levels of chaos in both settings (cumulative disadvantage) and for children who experienced no chaos in either setting (cumulative advantage). Children who experienced cumulative advantage across contexts made the greatest social-emotional and cognitive gains over the preschool year, while children who experienced cumulative disadvantage made the fewest gains over the preschool year.

That children who experienced cumulative advantage across contexts made the greatest social-emotional and cognitive gains over the preschool year is in line with prior work using data from the NICHD Study of Early Child Care and Youth Development, which lends itself well to examinations of children's experiences in multiple contexts. Children who experienced high levels of cognitive stimulation in each of their home, child care and first-grade classroom settings had higher rates of learning compared to children who experienced cognitive stimulation in fewer settings and children who had both high quality homes and high-quality child care settings were reported by their caregivers as having less internalizing and more prosocial behavior than children in homes and child care settings of lower quality (Crosnoe et al., 2010; Watamura et al., 2011).

Discontinuity in children's experiences of chaos across the home and classroom contexts—when one context is characterized by high levels of chaos while the other is

characterized by the absence of chaos—was hypothesized to combine in two different ways to influence children's development. When the home environment was the context high in chaos, could a non-chaotic classroom setting compensate for the disadvantage in the home? Or, when the home environment was absent of chaos, but the classroom context was high in chaos, would the protective nature of the home be lost to the disadvantage in the classroom?

The results of this study show that the potential compensatory effect of a non-chaotic context works in only one direction. Regardless of whether the level of chaos in their classroom was high or low, children who experienced high levels of chaos in their homes made fewer social-emotional gains over the preschool year than did children who experienced both non-chaotic homes and classrooms. The positive context provided by some classrooms could not compensate for the relative strength of a chaotic home environment, but importantly, the advantage of a non-chaotic home environment was not lost to a chaotic classroom. Thus, the ability for children to gain the most out of the preschool year depended heavily on children having a home environment that also promoted their development. Children who had been exposed to high levels of chaos in the home were less likely to gain from the Head Start experience than were children from homes lower in chaos.

The salience of the home context as a predictor of children's development relative to the classroom context was supported throughout all of the findings. It is not surprising that the home environment, the context in which all children in the study had been exposed to for years prior to Head Start entry, would be a more potent influence on development compared to the classroom context. This pattern of findings is also consistent with a wealth of research supporting the home as a predominant influence on children's development relative to other contexts. Findings from the NICHD Study of

Early Child Care and Youth Development (SECCYD) have shown that though the quality of child care is important for children's development, aspects of the home environment are stronger and more consistent predictors of early development (Network, 1998; 2001; 2002b). Highlighting the relative strength of the home context, family predictors including income, parenting attitudes and parenting style were just as predictive of development for children who experienced full-time non-parental care beginning in infancy as they were for children who were cared for almost exclusively by their mothers (Network, 1998). Maternal sensitivity, responsiveness, and psychological well-being predicted infant-mother attachment security at 15 months, but child care factors including observed quality and amount of nonmaternal care, age at entry into care, and frequency of changes in care arrangements did not independently predict attachment security (Network, 2001). Family factors including maternal vocabulary and the quality of the home environment accounted for a much larger proportion of the variance in children's cognitive outcomes across the first three years of life than did child care factors. The SECCYD has also shown that family risks, whether they be psychosocial (e.g., maternal depression, stress, and marital quality), socio-economic (e.g., maternal education), or sociocultural (e.g., family structure, ethnicity) were stronger predictors of children's social-emotional and cognitive development than either child care quality or quantity (Network, 2002b).

From a policy perspective, the comparatively small influence of experiences outside the home on children's development compared to the home environment speaks to several issues. Children's experiences in early education and care settings have been examined both for their potential benefits for children growing up in low-income or poor families and for their potential harm for children from a range of socioeconomic backgrounds (Network, 2002b). For those who worry the influence of the family is

waning as children spend more time in out-of-home contexts, this study suggests that the home environment remains predominant. And though the over-powering nature of the home influence may seem discouraging news for early education and intervention programs aimed at preparing at-risk children for school, high-quality programs including Head Start are already using the strong influence of the home to their advantage. These findings suggest that they should do even more to incorporate children's home and family experiences into their early education and care settings. One of the "active ingredients" in a high-quality preschool intervention is parent outreach. Edward Zigler, called by many as "the father of Head Start" because of his work in the 1960s to develop Head Start, has noted that because the home and family context are so important for children's acquisition of most competencies, intervention must begin early and it must enlist parents as children's first and most influential teachers (Duncan, Ludwig & Magnuson, 2007; Zigler, 2003, p. 10).

That interventions must begin early during childhood is also suggested by the present findings. Different patterns emerged when the relations between children's combined exposure to chaos across context and their development were examined separately for younger and older children. Classroom chaos relative to household chaos was a more potent influence on developmental gains in the sample of younger children, suggesting that the classroom environment relative to the home environment is particularly salient for younger children. By contrast, household chaos relative to the classroom chaos was a more potent influence on development in the sample of older children.

Often younger and older children were in the same classroom, so it is unlikely that this finding is because younger children experienced more chaotic classrooms than did the older children. Both older and younger children had been exposed to their

classroom environments for the same amount of time, but older children had been exposed to their home environment for an additional year compared to younger children, which may speak to why household chaos was a more salient predictor than classroom chaos for older children. Developmentally, younger children may have been more susceptible to a chaotic classroom because their cognitive and social-emotional skills were not as well developed as older children's to have to adjust to a new environment, and a new environment that was also chaotic.

Limitations and Future Directions

In addition to the limitations already noted, several limitations of this study need to be addressed. Many aspects of the methodology make this study a conservative estimate of the relationship between children's exposure to chaotic environments and their development. First, though the children in the study sample were all from low-income families, the study sample may not be representative of all low-income children because low-income parents who enroll their children into Head Start may represent a select group of low-income families. Awareness of the benefits of Head Start for young children, awareness of opportunities for enrollment at local Head Start programs, along with the motivation and time to enroll children in Head Start may be associated with daily lives that are less chaotic or more stable than the day-to-day experiences of low-income families who do not enroll their children in Head Start. In a study by the NICHD Early Child Care Research Network, the early family and life experiences of children eligible for federally subsidized preschool programs including Head Start were examined (Network, 2001b). When compared to children just above the poverty line and children substantially above poverty, children in poverty were more likely to be cared for by mothers who were either occasionally or chronically depressed, who provided less

stimulation and fewer opportunities for support and growth, and who were less sensitive to their children—characteristics that may not represent mothers who enroll their children into early intervention programs such as Head Start (Network, 2001b). Additionally, the classroom experiences of all children in the study were experiences of Head Start, a federally-regulated program, which likely restricted the variability in classroom chaos that could be examined. Studying chaos in a sample of low-income children in which they were not all enrolled in Head Start may yield greater variability in the levels of chaos which may in turn enable stronger associations between chaos and development in both the home and classroom settings than were found in this study.

Second, while each of the contexts of children's development influences their growth, the strength of those influences on development varies. The influence of the home context is not equal to the influence of other contexts (Network, 1998; 2001; 2002b). That exposure to chaos in the home was a more consistent predictor of development and mattered more for development than children's exposure to chaos in their classroom settings was not unexpected. Even still, exposure to chaos in the preschool classroom did emerge as a negative influence on development in the present study and may have even been underestimated given the limited variability in the amount of chaos to which children were exposed.

Third, the measurement of chaos in the present study may have led to an underestimation of the association between chaos and development. Similar to much of the prior research, chaos was examined as static, point-in-time indicators, even though it is inherently a fluid construct and may be more appropriately examined as an accumulation of disruptive environmental characteristics over multiple time points (Vernon-Feagans et al., 2012).

Finally, in the present study, children's exposure to chaos was examined as a predictor of children's *growth* over a year of preschool. The specific period of time over which children's growth was examined was from the fall of their Head Start year to the spring of their Head Start year, which at best may have only been a period of nine months. Examining growth over a longer period of time would have likely allowed for greater growth to occur, but because change was examined over such a narrow time frame, this too may have led to an underestimation of the relationship between chaos and development.

Although a key advantage to the present study is that chaos was investigated in *two* important contexts for children's early development and is the first to incorporate aspects of both disorder and turbulence into an aggregate measure of classroom chaos, the operationalization of chaos could be improved with more precise measurement and with additional indicators. For one, high levels of background noise or auditory stimulation are often incorporated into studies of chaos (Evans, Hygge, & Bulliner, 1995; Hygge et al., 2002), but there was no available indicator of noise in either context. Second, the measurement of crowding in both contexts could have been more precise had the number of rooms in the house and the size of the classroom space, or the number of material resources in the classroom been available. If such additional information had been incorporated, the present indicators of household and classroom crowding would have more accurately reflected measures of density, which are typically used in studies of chaos (Evans, 2006). Third, the indicator of routines in the classroom setting could be improved as well. Lack of routine in the classroom was assessed using the best available measure in the data, which was the Program Structure subscale of the Early Childhood Environment Rating Scale (ECERS). The Program Structure subscale was chosen as an alternative measure of classroom routine to teachers' use of a daily plan, which had

virtually no variability as almost every teacher reported using a daily plan. Low scores on the Program Structure subscale are indicative of lack of structure or routine (e.g., no posted daily schedule; staff not actively engaged in facilitating play), but a lack of structure may also be associated with high levels of child-directed activities and play which can promote children's cognitive development (Isenberg & Quisenberry, 2002). Thus, it is difficult to know whether low scores on the Program Structure subscale truly reflected the lack of predictability and order associated with contexts lacking routine. Finally, whether or not a child experienced a change in family structure over the preschool year or even their history of experiencing changes in family structure since birth would have been more accurate representations of family instability. The latter was not available in the data, and too few children experienced a change in family structure over the preschool year to be a valid predictor. Instead, a variable indicating that the child did not live with both biological/adoptive parents was used, which assumed that at some point the child experienced a parental partner transition or was at least more likely to experience such a transition compared to children who were living with both biological/adoptive parents.

The two contexts studied here—the home and early learning and care (ELC) settings—are inherently different from each other. Home environments typically have fewer children, offer more opportunity for one-on-one adult-child interaction, and are less noisy than ELC settings. Given these differences, what makes one context chaotic may be different from what makes another chaotic. Environmental characteristics that are disruptive in one setting may not be as disruptive in another. For example, a certain level of noise in the home may not be nearly as disruptive in a classroom environment, where the normative amount of noise is louder than noise in the home. Future research should

give careful attention to the validity of their definitions and assessments of chaos in different contexts.

This study was a test of how children's exposure to chaos within two settings predicted their development and how that exposure combined across settings to predict development. This study was not a test of the specific processes by which that exposure influenced development. Studying parent and teacher behaviors as mediators of the association between exposure to chaos and development is the logical next step. The prior research indicates that parent behaviors, but not teacher behaviors mediate the relations between chaos and children's development (Wachs et al., 2004). Several studies support parent behaviors as mediators but only one study has examined teacher behaviors as a mediator. As the study of chaos expands into other important contexts for children's development, including their early learning and care settings, it will be important for future research to study the processes by which chaos influences development in each context, as they may differ across setting.

Children's exposure to both household and classroom chaos was measured over the preschool year—the same time period over which children's gains in social-emotional and cognitive skills were assessed. Even though household chaos was assessed over the preschool year, presumably children had already been exposed to household chaos prior to entering Head Start. The present analyses, although not longitudinal, did allow for conclusions about what conditions promoted or interfered with children's ability to gain from a year of preschool. Longitudinal analyses would have allowed for conclusions about the persistence of exposure to chaos as an influence on development—how long do the effects of chaos last and would have allowed for an examination of how exposure to chaos accumulates *over time* to influence development, not just across setting, which was

the goal of this study. Both the persistence of the chaos influence and how it might accumulate over time will be important to measure in future studies.

Final Conclusions

This study contributes to our growing understanding of children's development within multiple contexts through a systematic examination of children's exposure to chaos across two critical contexts for their early development. The findings highlight how the level of exposure to chaos in the home and early learning and care classroom combine to influence social-emotional and cognitive gains over a year of preschool in a sample of children from low-income families. Children's experiences in their home environments emerged as predominant, indicating that children who had non-chaotic home environments gained more from a year in preschool than did children who had chaotic homes. These findings provide additional support that effective and high-quality early education and care settings must incorporate children's home and family experiences.

Appendix A: Tables and Figures

Table 1. Summary of Data Collection by Time Point

	Time 1	Time 2
	Fall 2006	Spring 2007
Direct Child Assessment	X	X
Parent Interview	X	X
Teacher Child Report	X	X
Teacher Interview	X	X
Classroom Observation		X
Center Director Interview	X	

Source: West et al. (2010). Head Start Family and Child Experiences Survey: 2006 User Manual

Table 2. Select Descriptive Characteristics of Analysis Samples

	Full Analysis Sample (N=2447)	Cognitive Analysis Sample (N=2067)	Chaos Risk Profiles Analysis Sample (N=1292)	Chaos Risk Profiles Cognitive Analysis Sample (N=1081)
Child gender (Boy)	51.1%	51.6%	51.0%	51.1%
Cohort (Age 3)	60.6%	58.6%	60.7%	58.8%
Child race/ethnicity (Black)	34.3%	39.3%	34.1%	39.5%
Child race/ethnicity (Hispanic)	37.5%	28.6%	37.9%	28.0%
Child has a disability	5.6%	5.8%	5.9%	6.3%
Child was born LBW	11.7%	11.8%	10.6%	10.7%
Child lives in poverty	56.1%	55.5%	57.9%	56.8%
Family uses multiple public assistance	54.3%	56.9%	52.5%	55.3%
Family household language = English	71.4%	81.2%	70.2%	80.9%
Mother has a HS diploma or higher	63.4%	67.8%	63.5%	68.5%
Father has a HS diploma or higher	54.3%	61.5%	54.7%	62.4%
Parent Depression Score	5.20 (6.10)	5.50 (6.15)	5.34 (6.40)	5.68 (6.45)
Father is working full-time	72.1%	70.2%	70.9%	68.6%
Mother is working full-time	33.0%	34.0%	34.1%	35.2%
Teacher has a BA or higher	40.1%	41.3%	39.7%	41.1%
Teachers has a CDA credential	55.2%	54.7%	54.1%	52.8%
Teacher is of Spanish, Hispanic, or Latino origin	22.0%	18.0%	22.1%	18.0%
Teacher is Black, African American	36.0%	39.0%	36.0%	39.4%
Number of years teaching Head Start	8.67 (6.32)	8.73 (6.40)	8.67 (6.23)	8.74 (6.34)
Teacher Depression Score	4.40 (5.02)	4.39 (4.90)	4.48 (5.01)	4.53 (5.01)

Note. The analytic sample for analyses predicting cognitive outcomes was restricted to children who were assessed in English in both the fall and spring of their Head Start year. The analytic sample for analyses in which children were grouped into one of five categories based on their experiences of risk across setting was restricted to only children who were grouped into the five categories.

Table 3. Unweighted Response Rates by Wave at Child Level

	Fall 2006	Spring 2007
Sampled and Eligible	3612	3177
Consented	3315	2914
Consent Rate	91.8%	91.7%
Completed Child Assessment	3182	2851
Child Assessment Completion Rate[a]	96.0%	97.8%
Completed Parent Interview	3190	2686
Parent Interview Completion Rate[a]	96.2%	92.2%
Teacher Child Report Completed	3155	2784
Teacher Child Report Completion Rate[a]	95.2%	95.5%

[a]Among consented children

Source: West et al. (2010). Head Start FACES 2006 User Manual

Table 4. Household and Classroom Chaos Indices Frequencies

Total Number of Chaos Indicators	Household Chaos Index			Household Chaos Index (Top-Coded at 2)		
	Total	Age 3 Cohort	Age 4 Cohort	Total	Age 3 Cohort	Age 4 Cohort
0	796 (32.5%)	473 (31.9%)	323 (33.5%)	796 (32.5%)	473 (31.9%)	323 (33.5%)
1	1018 (41.6%)	640 (43.1%)	378 (39.3%)	1018 (41.6%)	640 (43.1%)	378 (39.3%)
2	508 (20.8%)	302 (20.4%)	206 (21.4%)			
3	109 (4.5%)	62 (4.2%)	47 (4.9%)	633 (25.9%)	371 (25.0%)	262 (27.2%)
4	15 (0.6%)	6 (0.4%)	9 (0.9%)			
5	1 (0.0%)	1 (0.1%)	0			
Total Number of Chaos Indicators	Classroom Chaos Index			Classroom Chaos Index (Top-Coded at 2)		
	Total	Age 3 Cohort	Age 4 Cohort	Total	Age 3 Cohort	Age 4 Cohort
0	1438 (58.8%)	904 (60.9%)	534 (55.5%)	1438 (58.8%)	904 (60.9%)	534 (55.5%)
1	811 (33.1%)	466 (31.4%)	345 (35.8%)	811 (33.1%)	466 (31.4%)	345 (35.8%)
2	163 (6.7%)	94 (6.3%)	69 (7.2%)			
3	32 (1.3%)	18 (1.2%)	14 (1.5%)	198 (8.1%)	114 (7.7%)	84 (8.7%)
4	3 (0.1%)	2 (0.1)	1 (0.1%)			
5	0	0	0			

Note. Frequencies are for the full analysis sample (Total N=2447; Age 3 Cohort N=1484; Age 4 Cohort N=963)

Table 5. Children's Experiences of Chaos across Settings Frequencies

Home x Classroom Chaos Category	Score on Household Chaos Index	Score on Classroom Chaos Index	Frequency		
			Total	Age 3 Cohort	Age 4 Cohort
Double Jeopardy	2+	2+	60 (4.6%)	34 (4.3%)	26 (5.1%)
Double Protection	0	0	487 (37.7%)	309 (39.4%)	178 (35.0%)
Compensatory Care	2+	0	357 (27.6%)	210 (26.8%)	147 (28.9%)
Lost Resources	0	2+	51 (3.9%)	28 (3.6%)	23 (4.5%)
Average Chaos group	1	1	337 (26.1%)	203 (25.9%)	134 (26.4%)

Note. Total N=1292; Age 3 Cohort N=784; Age 4 Cohort N=508

Table 6. Descriptive Statistics and Frequencies of Children's Exposure to Chaos

Household Chaos Indicator	M	SD	Min	Max	% Exposed to Risk
Number of Adults in Home	1.97	0.90	1	7	6.6%
Number of Children in Home	2.57	1.21	1	8	6.5%
Bedtime Routines 4 weekdays	0.85	0.36	0	1	14.9%
# of Days/Week Family Eats Dinner Together	5.32	1.82	0	7	7.9%
Number of moves in last 24 months	0.73	1.18	0	10	17.9%
Child Lives with Both Bio/Adoptive Mom & Dad	0.47	0.50	0	1	52.6%
Classroom Chaos Indicator	M	SD	Min	Max	% Exposed to Risk
Child/Teacher Ratio	9.23	2.62	1	21	7.5%
Number of Children	17.62	2.36	1	23	2.6%
ECERS Program Structure	3.84	0.93	1	7	10.2%
# of Child Care Arrangements	0.54	0.79	0	6	10.5%
# of Absences	6.95	6.48	0	90	12.3%
Experienced a Teacher Change	0.10	0.30	0	1	9.6%

Note. N=2447

Table 7. Correlations among Household and Classroom Chaos and Children's Social and Cognitive Development

	Behavior Problems		Social Skills		PPVT	Woodcock-Johnson Letter-Word	Woodcock-Johnson Applied-Problems	Woodcock-Johnson Spelling
	TR	PR	TR	PR				
Indicators of Household Chaos								
Number of Adults in Home > 3	-.02	**.06	.00	-.01	**-.10	-.04	*-.05	-.01
Number of Children in Home > 4	-.01	.01	-.02	*-.04	*-.05	**-.06	-.01	-.02
Bedtime Routines < 4 days a week	.02	**.09	-.03	**-.08	**-.04	-.04	**-.07	-.04
Mealtime Routines < 3 days a week	.01	**.06	-.01	**-.06	-.03	-.01	**-.05	**-.05
Family moved 2+ times in last 24 months	**.07	**.09	-.02	**-.05	**-.05	*-.05	-.04	*-.05
Child does not live with both bio/adoptive mom & dad	**.09	-.03	**-.06	-.02	**.10	.00	.00	*-.05
Indicators of Classroom Chaos								
Child/Teacher Ratio > 11	*-.05	-.01	.03	.03	.02	.04	**.06	**.08
Number of Children > 20	**.06	-.01	**-.07	.00	*-.05	-.02	-.03	*-.05
ECERS Program Structure < 2.75	-.03	.02	.01	.02	*.04	.03	*.05	**.07
# of Child Care Arrangements >= 2	.03	.02	.00	**-.06	.03	.02	.00	*-.05
# of Absences >= 14	**.08	*.05	*-.05	-.03	.04	-.03	.00	-.03
Teacher Change	.01	.04	-.04	.00	*-.05	**-.06	.03	-.01
Chaos Risk Indices								
Household Chaos Index (top-coded at 2)	**.08	**.09	**-.07	**-.10	-.02	**-.05	*-.05	**-.06
Classroom Chaos Index (top-coded at 2)	.02	**.05	-.03	-.02	.03	.00	**.06	.02
Chaos Risk Profiles across Context								
Double Jeopardy	.00	.04	-.01	-.01	.00	.00	-.02	-.02
Double Protection	*-.04	**-.07	**.05	**.09	.00	.02	-.01	.01
Compensatory Care	*.05	**.07	-.04	**-.07	*-.05	-.04	-.03	**-.06
Lost Resources	.00	.02	.00	.00	.00	-.01	.00	-.01

Note. *Correlation is significant at p<0.05 level (2-tailed); **Correlation is significant at p<0.01 level (2-tailed); TR=Teacher-reported; PR=Parent-reported; N(Social-Emotional Outcomes)=2447; N(Cognitive Outcomes)=2067

Table 8: Standardized Coefficients (β) from Indicator Analyses Predicting Children's Social-Emotional Development

	Problem Behavior		Social Skills	
	TR	PR	TR	PR
Indicators of Household Chaos				
Number of Adults > 3	0.00	0.00	-0.01	0.01
Number of Children > 4	0.01	0.00	-0.02	-0.04
Bedtime Routines < 4 days a week	-0.01	**0.07	0.02	**-0.06
Mealtime Routines < 3 days a week	0.01	0.03	-0.01	-0.03
Family moved 2+ times in last 24 months	0.01	**0.05	0.00	*-0.04
Child does not live with both bio/adoptive mom & dad	*0.05	-0.01	-0.03	0.00
Indicators of Classroom Chaos				
Child/Teacher Ratio > 11	-0.03	-0.10	0.05	0.23
Number of Children > 20	0.12	-0.14	-0.05	-0.09
ECERS Program Structure < 2.75	0.01	0.25	-0.01	0.15
# of Child Care Arrangements >= 2	0.03	0.03	-0.01	*-0.04
# of Absences >= 14	*0.04	**0.04	-0.03	*-0.04
Teacher Change	0.06	0.03	-0.08	-0.01
Covariates				
Child gender (Boy)	**0.09	**0.06	**-0.09	**-0.08
Cohort (Age 3)	*0.04	0.03	**-0.09	**-0.07
Child race/ethnicity (Black)	0.04	-0.03	-0.01	0.03
Child race/ethnicity (Hispanic)	0.00	0.00	0.02	-0.02
Child Disability Status	0.04	**0.05	-0.04	-0.02
Child was born LBW	0.00	*0.05	-0.02	-0.04
Child lives in poverty	0.01	-0.02	-0.01	0.02
Family uses multiple public assistance	0.00	0.03	-0.01	0.00
Family household language = English	0.04	**-0.15	-0.03	0.01
Mother has a HS diploma or higher	-0.01	**-0.07	0.01	0.00
Father has a HS diploma or higher	0.05	*-0.06	-0.01	0.00
Parent Depression Score	0.02	**0.11	-0.01	-0.04
Father is working full-time	-0.01	0.03	0.01	-0.01
Mother is working full-time	0.03	-0.03	0.00	0.01
Teacher has a BA or higher	*0.12	-0.16	-0.08	-0.29
Teachers has a CDA credential	**0.17	0.05	-0.04	0.08
Teacher is of Spanish, Hispanic, or Latino origin	**-0.21	0.08	0.05	0.58
Teacher is Black, African American	-0.08	0.69	*-0.16	-0.47
Number of years teaching Head Start	**-0.15	0.10	0.03	-0.27
Teacher Depression Score	-0.02	0.08	0.01	-0.13
Outcome assessed in fall	**0.70	**0.50	**0.61	**0.44
R^2 - Within Level	**0.52	**0.31	**0.40	**0.22
R^2 - Between Level	*0.13	0.62	0.04	0.82

Note. **p<.01; *p<.05; TR=Teacher-Reported; PR=Parent-Reported; N=2447

Table 9. Standardized Coefficients (β) from Indicator Analyses Predicting Children's Cognitive Development

	PPVT	WJ-Letter Word	WJ-Applied Problems	WJ-Spelling
Indicators of Household Chaos				
Number of Adults > 3	0.01	-0.02	-0.03	-0.03
Number of Children > 4	0.00	-0.02	0.03	-0.02
Bedtime Routines < 4 days a week	-0.01	-0.01	*-0.05	-0.02
Mealtime Routines < 3 days a week	0.00	0.00	-0.01	-0.03
Family moved 2+ times in last 24 months	-0.03	-0.02	**-0.05	**-0.04
Child does not live with both bio/adoptive mom & dad	*-0.05	-0.01	-0.03	-0.02
Indicators of Classroom Chaos				
Child/Teacher Ratio > 11	0.07	*0.17	0.07	0.08
Number of Children > 20	**-0.17	0.01	0.04	-0.11
ECERS Program Structure < 2.75	0.18	0.04	0.27	*0.22
# of Child Care Arrangements >= 2	-0.01	0.01	0.01	-0.02
# of Absences >= 14	-0.02	-0.01	-0.03	-0.02
Teacher Change	-0.02	-0.04	0.04	-0.02
Covariates				
Child gender (Boy)	*-0.03	**-0.07	**-0.07	**-0.17
Cohort (Age 3)	**-0.16	**-0.17	**-0.32	**-0.37
Child race/ethnicity (Black)	**-0.09	0.03	**-0.20	-0.04
Child race/ethnicity (Hispanic)	**-0.07	-0.05	**-0.14	0.02
Child Disability Status	**-0.06	-0.01	**-0.11	*-0.06
Child was born LBW	-0.02	-0.03	*-0.05	**-0.07
Child lives in poverty	-0.03	**-0.06	*-0.05	-0.03
Family uses multiple public assistance	0.02	-0.03	0.00	0.00
Family household language = English	**0.09	-0.03	**0.09	-0.03
Mother has a HS diploma or higher	*0.05	**0.07	**0.06	0.03
Father has a HS diploma or higher	0.00	-0.03	-0.01	0.02
Parent Depression Score	0.01	-0.02	0.02	-0.01
Father is working full-time	-0.01	0.01	0.01	-0.01
Mother is working full-time	-0.02	-0.02	0.00	0.02
Teacher has a BA or higher	-0.02	0.07	0.20	0.08
Teachers has a CDA credential	*-0.22	-0.04	-0.17	-0.10
Teacher is of Spanish, Hispanic, or Latino origin	-0.15	0.03	-0.05	0.00
Teacher is Black, African American	**-0.28	0.16	-0.25	0.10
Number of years teaching Head Start	0.09	-0.13	0.03	-0.05
Teacher Depression Score	-0.17	-0.02	-0.02	0.00
Outcome assessed in fall	**0.70	**0.52	**0.23	**0.25
R^2 - Within Level	**0.55	**0.33	**0.26	**0.25
R^2 - Between Level	**0.25	0.08	0.21	0.09

Note. ***p*<.01; **p*<.05; WJ=Woodcock Johnson; N=2067

Table 10. Standardized Coefficients (β) from Index Analyses Predicting Children's Social-Emotional Development

	Problem Behavior		Social Skills	
	TR	PR	TR	PR
Cumulative Chaos Indices (top-coded at 2)				
Household Chaos	0.02	**0.07	-0.03	**-0.07
Classroom Chaos	*0.07	**0.04	-0.04	-0.03
Covariates				
Child gender (Boy)	**0.09	**0.06	**-0.09	**-0.08
Cohort (Age 3)	*0.04	*0.04	**-0.09	**-0.07
Child race/ethnicity (Black)	0.04	-0.03	-0.01	0.04
Child race/ethnicity (Hispanic)	0.00	0.01	0.02	-0.01
Child Disability Status	0.04	*0.05	-0.04	-0.02
Child was born LBW	0.00	*0.04	-0.02	-0.04
Child lives in poverty	0.01	-0.02	-0.01	0.02
Family uses multiple public assistance	0.01	0.02	-0.02	0.01
Family household language = English	0.05	**-0.15	-0.02	0.02
Mother has a HS diploma or higher	-0.01	**-0.06	0.01	0.01
Father has a HS diploma or higher	0.05	-0.05	-0.01	-0.01
Parent Depression Score	0.02	**0.11	-0.01	-0.04
Father is working full-time	-0.01	0.04	0.01	0.00
Mother is working full-time	0.03	-0.03	0.00	0.01
Teacher has a BA or higher	0.09	-0.16	-0.06	-0.19
Teachers has a CDA credential	*0.16	0.14	-0.03	-0.03
Teacher is of Spanish, Hispanic, or Latino origin	*-0.22	0.09	0.05	0.58
Teacher is Black, African American	-0.09	0.70	-0.15	-0.57
Number of years teaching Head Start	*-0.15	0.00	0.04	-0.19
Teacher Depression Score	-0.02	0.09	0.01	-0.20
Outcome assessed in fall	*0.70	**0.50	**0.62	**0.45
R^2 - Within Level	**0.52	**0.31	**0.40	**0.22
R^2 - Between Level	*0.11	0.56	0.03	0.78

Note. **p<.01; *p<.05; TR=Teacher-Reported; PR=Parent-Reported; N=2447

Table 11. Standardized Coefficients (β) from Index Analyses Predicting Children's Cognitive Development

	PPVT	WJ-Letter Word	WJ-Applied Problems	WJ-Spelling
Cumulative Chaos Indices (top-coded at 2)				
Household Chaos	-0.03	-0.01	*-0.04	-0.04
Classroom Chaos	-0.01	0.01	0.03	-0.01
Covariates				
Child gender (Boy)	*-0.03	**-0.07	**-0.06	**-0.16
Cohort (Age 3)	**-0.15	**-0.17	**-0.31	**-0.37
Child race/ethnicity (Black)	**-0.09	0.03	**-0.19	-0.04
Child race/ethnicity (Hispanic)	*-0.06	-0.05	**-0.13	0.03
Child Disability Status	*-0.06	-0.01	**-0.11	*-0.05
Child was born LBW	-0.02	-0.03	*-0.04	**-0.07
Child lives in poverty	-0.03	*-0.06	-0.04	-0.03
Family uses multiple public assistance	0.01	-0.03	0.00	-0.01
Family household language = English	**0.08	-0.03	**0.09	-0.03
Mother has a HS diploma or higher	**0.05	**0.07	**0.06	0.04
Father has a HS diploma or higher	0.00	-0.02	0.00	0.03
Parent Depression Score	0.01	-0.02	0.01	-0.02
Father is working full-time	-0.01	0.02	0.02	-0.01
Mother is working full-time	-0.02	-0.02	0.00	0.01
Teacher has a BA or higher	0.02	0.11	0.20	0.12
Teachers has a CDA credential	*-0.22	-0.03	-0.21	-0.10
Teacher is of Spanish, Hispanic, or Latino origin	-0.12	0.04	-0.02	0.01
Teacher is Black, African American	**-0.26	0.16	-0.25	0.10
Number of years teaching Head Start	0.09	-0.10	0.03	-0.05
Teacher Depression Score	*-0.19	-0.02	-0.05	-0.01
Outcome assessed in fall	**0.70	**0.54	**0.26	**0.27
R^2 - Within Level	**0.55	**0.34	**0.25	**0.25
R^2 - Between Level	*0.17	0.05	0.15	0.04

Note. ***p*<.01; **p*<.05; WJ=Woodcock Johnson; N=2067

Table 12. Standardized Coefficients (β) from Index Analyses Predicting Children's Social-Emotional Development for Younger Children (Age 3)

	Problem Behavior		Social Skills	
	TR	PR	TR	PR
Cumulative Chaos Indices (top-coded at 2)				
Household Chaos	0.02	0.03	-0.01	-0.04
Classroom Chaos	*0.06	0.04	-0.03	**-0.07
Covariates				
Child gender (Boy)	**0.08	**0.07	**-0.09	**-0.11
Child race/ethnicity (Black)	0.07	-0.06	-0.01	0.06
Child race/ethnicity (Hispanic)	0.07	-0.02	0.01	-0.03
Child Disability Status	0.03	0.05	-0.04	-0.02
Child was born LBW	0.00	*0.06	-0.03	-0.04
Child lives in poverty	0.02	0.01	-0.02	0.02
Family uses multiple public assistance	0.02	0.03	-0.03	-0.02
Family household language = English	0.04	**-0.15	-0.03	-0.01
Mother has a HS diploma or higher	0.00	**-0.09	0.03	-0.03
Father has a HS diploma or higher	*0.06	-0.04	-0.02	0.01
Parent Depression Score	0.01	**0.13	0.01	-0.03
Father is working full-time	0.00	0.06	0.03	-0.02
Mother is working full-time	*0.04	-0.02	0.00	0.03
Teacher has a BA or higher	0.08	-0.11	-0.02	0.04
Teachers has a CDA credential	**0.20	-0.18	-0.12	-0.44
Teacher is of Spanish, Hispanic, or Latino origin	**-0.33	-0.02	0.15	0.61
Teacher is Black, African American	*-0.17	0.66	-0.05	-0.23
Number of years teaching Head Start	*-0.18	-0.13	0.09	0.04
Teacher Depression Score	-0.08	0.23	0.03	-0.39
Outcome assessed in fall	**0.71	**0.47	**0.62	**0.44
R^2 - Within Level	**0.53	**0.29	**0.40	**0.22
R^2 - Between Level	*0.22	0.54	0.05	0.78

Note. **p<.01; *p<.05; TR=Teacher-Reported; PR=Parent-Reported; N=1484

Table 13. Standardized Coefficients (β) from Index Analyses Predicting Children's Social-Emotional Development for Older Children (Age 4)

	Problem Behavior		Social Skills	
	TR	PR	TR	PR
Cumulative Chaos Indices (top-coded at 2)				
Household Chaos	0.04	*0.12	*-0.06	**-0.14
Classroom Chaos	*0.07	0.05	*-0.08	-0.01
Covariates				
Child gender (Boy)	**0.09	0.05	**-0.08	*-0.06
Child race/ethnicity (Black)	-0.01	0.00	0.03	-0.04
Child race/ethnicity (Hispanic)	**-0.12	0.04	0.06	-0.06
Child Disability Status	0.04	0.07	-0.04	-0.04
Child was born LBW	0.01	0.01	-0.02	-0.06
Child lives in poverty	0.01	*-0.07	0.00	-0.01
Family uses multiple public assistance	0.00	0.02	0.03	0.02
Family household language = English	0.05	*-0.14	-0.01	-0.01
Mother has a HS diploma or higher	-0.03	-0.02	-0.03	0.06
Father has a HS diploma or higher	0.02	-0.07	0.01	-0.07
Parent Depression Score	0.05	*0.09	-0.05	*-0.08
Father is working full-time	0.01	0.00	-0.04	-0.05
Mother is working full-time	0.03	-0.04	-0.01	-0.03
Teacher has a BA or higher	0.06	-0.09	-0.08	-0.37
Teachers has a CDA credential	0.11	0.46	0.11	0.42
Teacher is of Spanish, Hispanic, or Latino origin	-0.06	0.20	-0.04	0.23
Teacher is Black, African American	0.08	0.34	**-0.27	-0.71
Number of years teaching Head Start	-0.16	0.20	-0.05	-0.06
Teacher Depression Score	0.10	-0.05	-0.07	0.30
Outcome assessed in fall	**0.69	*0.55	**0.60	**0.37
R^2 - Within Level	**0.52	**0.36	**0.39	**0.19
R^2 - Between Level	0.06	0.41	0.10	0.96

Note. **p<.01; *p<.05; TR=Teacher-Reported; PR=Parent-Reported; N=963

Table 14. Standardized Coefficients (β) from Index Analyses Predicting Children's Cognitive Development for Younger Children (Age 3)

	PPVT	WJ-Letter Word	WJ-Applied Problems	WJ-Spelling
Cumulative Chaos Indices (top-coded at 2)				
Household Chaos	-0.03	0.01	-0.03	-0.02
Classroom Chaos	-0.01	0.02	0.01	-0.01
Covariates				
Child gender (Boy)	-0.03	**-0.10	**-0.10	**-0.20
Child race/ethnicity (Black)	**-0.10	0.02	**-0.18	*-0.08
Child race/ethnicity (Hispanic)	-0.04	-0.07	**-0.14	-0.01
Child Disability Status	*-0.06	-0.02	**-0.13	*-0.06
Child was born LBW	-0.04	*-0.07	-0.05	**-0.10
Child lives in poverty	-0.03	*-0.06	-0.05	-0.02
Family uses multiple public assistance	0.02	-0.05	-0.02	0.01
Family household language = English	*0.06	-0.05	0.05	*-0.08
Mother has a HS diploma or higher	0.03	**0.09	*0.06	0.05
Father has a HS diploma or higher	0.01	0.01	-0.04	0.02
Parent Depression Score	-0.01	-0.02	0.00	-0.02
Father is working full-time	0.01	0.03	-0.02	-0.01
Mother is working full-time	0.01	0.00	0.02	0.03
Teacher has a BA or higher	-0.02	0.12	0.22	0.13
Teachers has a CDA credential	*-0.22	-0.08	-0.10	-0.12
Teacher is of Spanish, Hispanic, or Latino origin	-0.18	0.09	0.01	0.13
Teacher is Black, African American	*-0.28	0.17	-0.26	0.21
Number of years teaching Head Start	0.11	-0.04	-0.07	-0.14
Teacher Depression Score	*-0.24	0.00	-0.25	0.07
Outcome assessed in fall	**0.68	**0.48	**0.25	**0.29
R^2 - Within Level	**0.49	**0.27	**0.15	**0.16
R^2 - Between Level	*0.23	0.06	0.20	0.12

Note. **p<.01; *p<.05; WJ=Woodcock Johnson; N=1212

Table 15. Standardized Coefficients (β) from Index Analyses Predicting Children's Cognitive Development for Older Children (Age 4)

	PPVT	WJ-Letter Word	WJ-Applied Problems	WJ-Spelling
Cumulative Chaos Indices (top-coded at 2)				
Household Chaos	-0.05	-0.05	-0.06	-0.07
Classroom Chaos	-0.01	-0.02	*0.06	0.00
Covariates				
Child gender (Boy)	-0.04	-0.03	-0.04	**-0.13
Child race/ethnicity (Black)	**-0.10	0.03	**-0.28	0.00
Child race/ethnicity (Hispanic)	*-0.09	-0.03	**-0.20	0.09
Child Disability Status	**-0.07	-0.01	*-0.1	-0.06
Child was born LBW	0.01	0.01	*-0.07	-0.06
Child lives in poverty	-0.04	*-0.08	*-0.07	-0.07
Family uses multiple public assistance	0.00	0.00	-0.02	-0.03
Family household language = English	**0.11	0.00	*0.13	0.04
Mother has a HS diploma or higher	**0.07	0.04	0.06	0.03
Father has a HS diploma or higher	-0.01	-0.06	-0.04	0.02
Parent Depression Score	0.03	-0.02	0.01	-0.01
Father is working full-time	-0.01	-0.01	0.01	-0.01
Mother is working full-time	*-0.07	-0.04	-0.02	0.00
Teacher has a BA or higher	0.02	0.08	0.19	0.07
Teachers has a CDA credential	-0.32	-0.03	-0.71	-0.09
Teacher is of Spanish, Hispanic, or Latino origin	-0.07	0.03	-0.13	-0.12
Teacher is Black, African American	-0.33	0.21	-0.09	-0.06
Number of years teaching Head Start	0.04	-0.18	0.34	0.06
Teacher Depression Score	-0.21	-0.06	0.41	-0.10
Outcome assessed in fall	**0.70	**0.59	0.06	**0.28
R^2 - Within Level	**0.54	**0.36	**0.17	**0.12
R^2 - Between Level	0.26	0.09	0.85	0.05

Note. **p<.01; *p<.05; WJ=Woodcock Johnson; N=855

Table 16. Standardized Coefficients (β) from Index Interaction Analyses Predicting Children's Social-Emotional Development

	Problem Behavior		Social Skills	
	TR	PR	TR	PR
Cumulative Chaos Indices (top-coded at 2)				
Household Chaos	0.02	**0.08	-0.04	**-0.12
Classroom Chaos	*0.07	*0.07	*-0.07	**-0.10
Household Chaos x Classroom Chaos	0.00	-0.04	0.03	**0.10
Covariates				
Child gender (Boy)	**0.09	**0.06	**-0.09	**-0.08
Cohort (Age 3 or 4)	*0.04	0.04	**-0.09	**-0.08
Child race/ethnicity (Black)	0.04	-0.03	-0.01	0.04
Child race/ethnicity (Hispanic)	0.00	0.01	0.02	-0.01
Child Disability Status	0.04	*0.05	-0.04	-0.02
Child was born LBW	0.00	*0.04	-0.02	-0.04
Child lives in poverty	0.01	-0.02	-0.01	0.02
Family uses multiple public assistance	0.01	0.02	-0.02	0.01
Family household language = English	0.05	**-0.14	-0.02	0.01
Mother has a HS diploma or higher	-0.01	*-0.06	0.01	0.01
Father has a HS diploma or higher	0.05	-0.05	-0.01	-0.01
Parent Depression Score	0.02	**0.11	-0.01	-0.04
Father is working full-time	-0.01	0.04	0.01	0.00
Mother is working full-time	0.03	-0.03	0.00	0.01
Teacher has a BA or higher	0.09	-0.17	-0.06	-0.20
Teachers has a CDA credential	*0.16	0.15	-0.03	-0.04
Teacher is of Spanish, Hispanic, or Latino origin	**-0.22	0.08	0.05	0.62
Teacher is Black, African American	-0.09	0.71	-0.15	-0.52
Number of years teaching Head Start	*-0.15	0.02	0.04	-0.25
Teacher Depression Score	-0.02	0.08	0.01	-0.17
Outcome assessed in fall	**0.70	**0.50	**0.62	**0.44
R^2 - Within Level	**0.52	**0.32	**0.40	**0.24
R^2 - Between Level	*0.11	0.57	0.03	0.79

Note. **p<.01; *p<.05; TR=Teacher-Reported; PR=Parent-Reported; N=2447

Table 17. Standardized Coefficients (β) from Index Interaction Analyses Predicting Children's Cognitive Development

	PPVT	WJ-Letter Word	WJ-Applied Problems	WJ-Spelling
Cumulative Chaos Indices (top-coded at 2)				
Household Chaos	-0.02	-0.04	-0.02	*-0.06
Classroom Chaos	0.00	-0.04	*0.07	-0.04
Household Chaos x Classroom Chaos	-0.01	0.06	-0.06	0.05
Covariates				
Child gender (Boy)	*-0.03	**-0.07	**-0.06	**-0.16
Cohort (Age 3 or 4)	**-0.15	**-0.17	**-0.31	**-0.37
Child race/ethnicity (Black)	**-0.09	0.03	**-0.19	-0.04
Child race/ethnicity (Hispanic)	*-0.06	-0.05	**-0.13	0.03
Child Disability Status	**-0.06	-0.01	**-0.11	*-0.05
Child was born LBW	-0.02	-0.03	*-0.04	**-0.08
Child lives in poverty	-0.03	*-0.06	-0.04	-0.03
Family uses multiple public assistance	0.01	-0.03	0.01	-0.01
Family household language = English	**0.08	-0.03	**0.09	-0.03
Mother has a HS diploma or higher	*0.05	**0.07	**0.06	0.04
Father has a HS diploma or higher	0.00	-0.03	0.00	0.02
Parent Depression Score	0.01	-0.02	0.01	-0.02
Father is working full-time	-0.01	0.01	0.02	-0.01
Mother is working full-time	-0.02	-0.02	0.00	0.01
Teacher has a BA or higher	0.02	0.11	0.20	0.12
Teachers has a CDA credential	*-0.21	-0.03	-0.22	-0.10
Teacher is of Spanish, Hispanic, or Latino origin	-0.12	0.04	-0.02	0.02
Teacher is Black, African American	*-0.26	0.17	-0.26	0.11
Number of years teaching Head Start	0.09	-0.11	0.04	-0.06
Teacher Depression Score	*-0.19	-0.02	-0.05	-0.01
Outcome assessed in fall	**0.70	**0.54	**0.26	**0.26
R^2 - Within Level	**0.55	**0.34	**0.25	**0.25
R^2 - Between Level	*0.17	0.05	0.16	0.04

Note. **p<.01; *p<.05; WJ=Woodcock Johnson; N=2067

Table 18. Standardized Coefficients (β) from Chaos Profile Analyses Predicting Children's Development with the Medium Chaos Profile Omitted

	Problem Behaviors		Social Skills		PPVT	WJ-Letter Word	WJ-Applied Problems	WJ-Spelling
	TR	PR	TR	PR				
Chaos Profiles across Context								
Double Jeopardy	0.00	0.05	0.02	-0.01	-0.04	0.01	-0.03	-0.03
Double Protection	-0.04	**-0.09	0.03	*0.08	0.01	0.01	-0.02	0.01
Compensatory Care	-0.01	0.04	-0.02	-0.06	-0.03	-0.03	-0.02	-0.06
Lost Resources	0.02	0.01	-0.02	0.00	-0.02	-0.04	0.00	-0.03
Covariates								
Child gender (Boy)	**0.09	**0.08	**-0.08	**-0.11	**-0.11	**-0.09	*-0.06	**-0.16
Cohort (Age 3)	0.03	*0.05	**-0.08	*-0.07	*-0.07	**-0.21	**-0.30	**-0.37
Child race/ethnicity (Black)	0.01	-0.03	0.02	0.03	0.03	0.00	**-0.28	-0.05
Child race/ethnicity (Hispanic)	-0.04	0.01	0.03	-0.03	-0.03	-0.04	**-0.16	*0.09
Child Disability Status	-0.01	0.05	-0.02	-0.04	-0.04	0.00	**-0.08	-0.04
Child was born LBW	-0.02	0.06	-0.02	-0.04	-0.04	-0.02	-0.04	-0.04
Child lives in poverty	0.01	-0.03	-0.01	0.02	0.02	-0.04	-0.02	-0.04
Family uses multiple public assistance	0.02	-0.01	-0.01	0.01	0.01	-0.04	-0.01	-0.03
Family household language = English	0.04	**-0.17	-0.03	0.02	0.02	0.01	**0.11	0.03
Mother has a HS diploma or higher	-0.05	**-0.10	0.03	-0.02	-0.02	**0.09	**0.09	0.05
Father has a HS diploma or higher	*0.07	-0.05	-0.03	-0.02	-0.02	-0.02	-0.02	0.06
Parent Depression Score	0.02	**0.10	0.00	*-0.08	*-0.08	-0.03	-0.02	-0.02
Father is working full-time	-0.02	-0.04	0.07	0.00	0.00	0.01	-0.01	-0.04
Mother is working full-time	0.04	-0.01	-0.01	-0.02	-0.02	-0.06	0.00	-0.01
Teacher has a BA or higher	0.05	0.24	-0.02	0.13	0.13	0.08	0.20	0.08
Teachers has a CDA credential	0.12	0.11	0.06	0.29	0.29	-0.03	-0.06	-0.13
Teacher is of Spanish, Hispanic, or Latino origin	-0.15	0.32	0.03	0.10	0.10	-0.06	-0.04	-0.04
Teacher is Black, African American	-0.06	0.79	-0.17	-0.75	-0.75	0.18	0.00	0.22
Number of years teaching Head Start	-0.09	-0.12	0.04	-0.01	-0.01	-0.09	0.03	-0.14
Teacher Depression Score	-0.05	0.20	0.01	-0.43	-0.43	-0.08	-0.17	-0.01
Outcome assessed in fall	**0.70	**0.50	**0.62	**0.43	**0.43	**0.50	**0.24	**0.26
R^2 - Within Level	**0.51	**0.33	**0.41	**0.22	**0.55	**0.32	**0.29	**0.26
R^2 - Between Level	0.05	0.86	0.03	0.85	0.28	0.06	0.08	0.09

Note. ***p*<.01; **p*<.05; TR=Teacher-Reported; PR=Parent-Reported; WJ=Woodcock Johnson; N(Social-Emotional)=1292; N(Cognitive)=1081

Table 19. Standardized Coefficients (β) from Chaos Profile Analyses Predicting Children's Development with the Double Protection Profile Omitted

	Problem Behaviors		Social Skills		PPVT	WJ-Letter Word	WJ-Applied Problems	WJ-Spelling
	TR	PR	TR	PR				
Chaos Profiles across Context								
Double Jeopardy	0.02	**0.08	0.00	*-0.05	-0.04	0.01	-0.03	-0.03
Compensatory Care	0.03	**0.11	-0.06	**-0.14	-0.03	-0.04	0.00	*-0.07
Lost Resources	0.04	0.03	-0.03	-0.04	-0.02	-0.05	0.01	-0.04
Medium Chaos	0.04	0.05	-0.03	**-0.10	-0.01	-0.02	0.01	-0.01
Covariates								
Child gender (Boy)	**0.09	**0.07	**-0.08	**-0.11	-0.03	**-0.09	*-0.06	**-0.16
Cohort (Age 3 or 4)	0.02	*0.05	**-0.08	*-0.06	**-0.14	**-0.21	**-0.28	**-0.37
Child race/ethnicity (Black)	0.01	-0.03	0.02	0.04	**-0.12	0.00	**-0.27	-0.05
Child race/ethnicity (Hispanic)	-0.04	0.00	0.03	-0.02	-0.06	-0.04	**-0.15	*0.09
Child Disability Status	-0.01	0.05	-0.02	-0.04	**-0.07	0.00	*-0.08	-0.04
Child was born LBW	-0.02	0.06	-0.02	-0.04	-0.02	-0.02	-0.04	-0.04
Child lives in poverty	0.01	-0.03	-0.01	0.03	-0.02	-0.04	-0.01	-0.04
Family uses multiple public assistance	0.02	-0.01	-0.01	0.02	0.03	-0.04	0.00	-0.03
Family household language = English	0.04	**-0.18	-0.03	0.02	**0.10	0.01	**0.12	0.03
Mother has a HS diploma or higher	-0.05	**-0.10	0.03	-0.02	**0.07	**0.09	**0.10	0.05
Father has a HS diploma or higher	*0.07	-0.05	-0.03	-0.02	0.00	-0.02	-0.02	0.06
Parent Depression Score	0.02	**0.10	0.00	*-0.07	0.01	-0.03	-0.02	-0.02
Father is working full-time	-0.02	-0.04	0.07	0.00	-0.02	0.01	-0.01	-0.04
Mother is working full-time	0.04	-0.02	-0.01	-0.01	-0.02	-0.06	0.01	-0.01
Teacher has a BA or higher	0.05	0.24	-0.02	0.12	0.15	0.08	0.20	0.08
Teachers has a CDA credential	0.12	0.08	0.06	0.25	-0.18	-0.04	-0.06	-0.12
Teacher is of Spanish, Hispanic, or Latino origin	-0.15	0.35	0.03	0.08	-0.25	-0.06	-0.05	-0.04
Teacher is Black, African American	-0.06	0.81	-0.17	-0.75	*-0.27	0.18	-0.01	0.22
Number of years teaching Head Start	-0.09	-0.10	0.04	0.00	0.11	-0.09	0.04	-0.14
Teacher Depression Score	-0.05	0.22	0.01	-0.40	*-0.28	-0.08	-0.17	-0.01
Outcome assessed in fall	**0.70	**0.50	**0.62	**0.43	**0.70	**0.50	**0.29	**0.26
R^2 - Within Level	**0.51	**0.33	**0.41	**0.25	**0.55	**0.32	**0.29	**0.26
R^2 - Between Level	0.05	0.90	0.03	0.81	*0.28	0.06	0.08	0.09

Note. ***p*<.01; **p*<.05; TR=Teacher-Reported; PR=Parent-Reported; WJ=Woodcock Johnson; N(Social-Emotional)=1292; N(Cognitive)=1081

Table 20. Standardized Coefficients (β) from Chaos Profile Analyses Predicting Children's Development with the Compensatory Care Profile Omitted

	Problem Behaviors		Social Skills		PPVT	WJ-Letter Word	WJ-Applied Problems	WJ-Spelling
	TR	PR	TR	PR				
Chaos Profiles across Context								
Double Jeopardy	0.00	0.02	0.03	0.01	-0.02	0.03	-0.03	0.00
Double Protection	-0.03	**-0.15	0.06	**0.12	0.04	0.04	-0.01	*0.07
Lost Resources	0.02	-0.02	-0.01	0.01	-0.01	-0.03	0.00	-0.01
Medium Chaos	0.01	*-0.07	0.02	0.02	0.02	0.02	0.01	0.06
Covariates								
Child gender (Boy)	**0.09	**0.08	**-0.08	**-0.11	-0.03	**-0.08	*-0.06	**-0.16
Cohort (Age 3 or 4)	0.03	*0.05	**-0.08	*-0.06	**-0.14	**-0.19	**-0.30	**-0.37
Child race/ethnicity (Black)	0.01	-0.03	0.02	0.03	**-0.12	0.00	**-0.28	-0.05
Child race/ethnicity (Hispanic)	-0.04	0.01	0.03	-0.02	-0.06	-0.03	**-0.16	*0.09
Child Disability Status	-0.01	0.05	-0.02	-0.04	**-0.07	0.00	**-0.08	-0.04
Child was born LBW	-0.02	0.06	-0.02	-0.04	-0.02	-0.02	-0.04	-0.04
Child lives in poverty	0.01	-0.03	-0.01	0.03	-0.02	-0.04	-0.02	-0.04
Family uses multiple public assistance	0.02	-0.01	-0.01	0.01	0.03	-0.03	-0.01	-0.03
Family household language = English	0.04	**-0.17	-0.03	0.02	**0.10	0.01	**0.11	0.03
Mother has a HS diploma or higher	-0.05	*-0.09	0.03	-0.02	**0.07	**0.09	**0.09	0.05
Father has a HS diploma or higher	*0.07	-0.05	-0.03	-0.02	0.00	-0.02	-0.02	0.06
Parent Depression Score	0.02	**0.10	0.00	*-0.08	0.01	-0.03	-0.02	-0.02
Father is working full-time	-0.02	-0.03	0.07	0.00	-0.02	0.02	-0.02	-0.04
Mother is working full-time	0.04	-0.01	-0.01	-0.02	-0.02	-0.05	0.00	-0.01
Teacher has a BA or higher	0.05	0.26	-0.02	0.13	0.15	0.08	0.20	0.08
Teachers has a CDA credential	0.12	0.10	0.06	0.26	-0.18	-0.03	-0.06	-0.12
Teacher is of Spanish, Hispanic, or Latino origin	-0.15	0.33	0.03	0.10	-0.25	-0.07	-0.03	-0.04
Teacher is Black, African American	-0.06	0.77	-0.17	-0.76	*-0.27	0.17	0.00	0.22
Number of years teaching Head Start	-0.09	-0.09	0.04	0.01	0.11	-0.09	0.03	-0.14
Teacher Depression Score	-0.05	0.20	0.01	-0.41	*-0.28	-0.08	-0.17	-0.01
Outcome assessed in fall	**0.70	**0.49	**0.62	**0.43	**0.70	**0.52	**0.24	**0.26
R^2 - Within Level	**0.51	**0.34	**0.41	**0.23	**0.55	**0.34	**0.29	**0.26
R^2 - Between Level	0.05	0.83	0.03	0.84	*0.28	0.05	0.08	0.09

Note. **p<.01; *p<.05; TR=Teacher-Reported; PR=Parent-Reported; WJ=Woodcock Johnson; N(Social-Emotional)=1292; N(Cognitive)=1081

Table 21. Standardized Coefficients (β) from Chaos Profile Analyses Predicting Children's Development with the Medium Chaos Profile Omitted for Age 3 Cohort

	Problem Behavior		Social Skills		PPVT	WJ-Letter Word	WJ-Applied Problems	WJ-Spelling
	TR	PR	TR	PR				
Chaos Profiles across Context								
Double Jeopardy	-0.02	0.04	0.06	-0.01	-0.04	0.00	-0.06	-0.04
Double Protection	-0.04	*-0.09	0.03	*0.10	0.03	0.00	0.02	0.02
Compensatory Care	-0.03	0.01	-0.03	0.01	-0.01	0.00	0.05	-0.04
Lost Resources	**0.07	0.00	*-0.07	0.00	-0.01	-0.06	-0.02	-0.06
R^2 - Within Level	**0.52	**0.29	**0.42	**0.26	**0.47	**0.27	**0.22	**0.16
R^2 - Between Level	*0.23	0.77	0.05	0.41	0.67	0.08	0.20	0.17

Note. ***p*<.01; **p*<.05; TR=Teacher-Reported; PR=Parent-Reported; WJ=Woodcock Johnson; N(Social-Emotional)=784; N(Cognitive)=636; Covariates were included in analyses, but are not presented

Table 22. Standardized Coefficients (β) from Chaos Profile Analyses Predicting Children's Development with the Medium Chaos Profile Omitted for Age 4 Cohort

	Problem Behavior		Social Skills		PPVT	WJ-Letter Word	WJ-Applied Problems	WJ-Spelling
	TR	PR	TR	PR				
Chaos Profiles across Context								
Double Jeopardy	0.02	0.07	-0.06	-0.02	-0.04	0.01	0.00	-0.02
Double Protection	-0.08	*-0.11	0.06	0.07	-0.02	0.08	-0.09	-0.01
Compensatory Care	0.02	0.07	-0.02	*-0.14	-0.06	-0.03	*-0.12	-0.10
Lost Resources	-0.06	0.00	0.05	0.00	-0.03	0.00	0.01	-0.01
R^2 - Within Level	**0.50	**0.43	**0.38	**0.24	**0.57	**0.39	**0.28	**0.12
R^2 - Between Level	0.05	0.80	0.14	0.97	0.15	0.16	0.53	0.24

Note. **p<.01; *p<.05; TR=Teacher-Reported; PR=Parent-Reported; WJ=Woodcock Johnson; N(Social-Emotional)=508; N(Cognitive)=445; Covariates were included in analyses, but are not presented

Table 23. Standardized Coefficients (β) from Chaos Profile Analyses Predicting Children's Development with the Double Protection Profile Omitted for Age 3 Cohort

	Problem Behavior		Social Skills		PPVT	WJ-Letter Word	WJ-Applied Problems	WJ-Spelling
	TR	PR	TR	PR				
Chaos Profiles across Context								
Double Jeopardy	0.00	*0.06	0.04	-0.05	-0.06	0.00	-0.06	-0.05
Compensatory Care	0.00	*0.08	-0.06	*-0.08	-0.03	-0.01	0.03	-0.06
Lost Resources	*0.08	0.03	*-0.08	-0.04	-0.03	-0.06	-0.03	*-0.07
Medium Chaos	0.03	0.05	-0.03	*-0.09	-0.03	0.00	-0.02	-0.02
R^2 - Within Level	**0.52	**0.29	**0.42	**0.27	**0.47	**0.27	**0.22	**0.17
R^2 - Between Level	*0.23	0.83	0.05	0.40	0.69	0.08	0.20	0.17

Note. ***p*<.01; **p*<.05; TR=Teacher-Reported; PR=Parent-Reported; WJ=Woodcock Johnson; N(Social-Emotional)=784; N(Cognitive)=636; Covariates were included in analyses, but are not presented

Table 24. Standardized Coefficients (β) from Chaos Profile Analyses Predicting Children's Development with the Double Protection Profile Omitted for Age 4 Cohort

	Problem Behavior		Social Skills		PPVT	WJ-Letter Word	WJ-Applied Problems	WJ-Spelling
	TR	PR	TR	PR				
Chaos Profiles across Context								
Double Jeopardy	0.06	*0.11	-0.09	-0.07	-0.04	-0.02	0.03	-0.02
Compensatory Care	*0.10	**0.16	-0.08	**-0.24	-0.05	*-0.11	-0.05	-0.10
Lost Resources	-0.02	0.04	0.02	-0.04	-0.02	-0.04	0.04	-0.01
Medium Chaos	0.08	0.06	-0.06	**-0.15	0.01	-0.07	0.04	0.01
R^2 - Within Level	**0.51	**0.44	**0.39	**0.29	**0.56	**0.37	**0.26	**0.11
R^2 - Between Level	0.05	0.86	0.14	0.97	0.14	0.15	0.52	0.24

Note. ***p*<.01; **p*<.05; TR=Teacher-Reported; PR=Parent-Reported; WJ=Woodcock Johnson; N(Social-Emotional)=508; N(Cognitive)=445; Covariates were included in analyses, but are not presented

Table 25. Standardized Coefficients (β) from Chaos Profile Analyses Predicting Children's Development with the Compensatory Care Profile Omitted for Age 3 Cohort

	Problem Behavior		Social Skills		PPVT	WJ-Letter Word	WJ-Applied Problems	WJ-Spelling
	TR	PR	TR	PR				
Chaos Profiles across Context								
Double Jeopardy	0.00	0.02	*0.07	-0.01	-0.04	0.01	-0.08	-0.02
Double Protection	-0.01	**-0.12	0.06	0.09	0.04	0.01	-0.03	0.07
Lost Resources	*0.08	-0.01	-0.06	0.00	-0.01	-0.05	-0.05	-0.04
Medium Chaos	0.03	-0.04	0.03	-0.01	0.01	0.00	-0.05	0.04
R^2 - Within Level	**0.52	**0.29	**0.42	**0.26	**0.47	**0.27	**0.22	**0.16
R^2 - Between Level	*0.23	0.73	0.05	0.41	0.67	0.08	0.20	0.17

Note. ***p*<.01; **p*<.05; TR=Teacher-Reported; PR=Parent-Reported; WJ=Woodcock Johnson; N(Social-Emotional)=784; N(Cognitive)=636; Covariates were included in analyses, but are not presented

Table 26. Standardized Coefficients (β) from Chaos Profile Analyses Predicting Children's Development with the Compensatory Care Profile Omitted for Age 4 Cohort

	Problem Behavior		Social Skills		PPVT	WJ-Letter Word	WJ-Applied Problems	WJ-Spelling
	TR	PR	TR	PR				
Chaos Profiles across Context								
Double Jeopardy	0.01	0.03	-0.05	0.03	-0.01	0.03	0.02	0.03
Double Protection	*-0.10	**-0.20	0.08	**0.16	0.05	0.11	0.04	0.10
Lost Resources	-0.06	-0.04	0.06	0.04	0.00	0.02	0.08	0.04
Medium Chaos	-0.02	*-0.10	0.02	0.04	0.06	0.03	0.08	0.10
R^2 - Within Level	**0.50	**0.45	**0.39	**0.24	**0.57	**0.40	**0.30	**0.13
R^2 - Between Level	0.05	0.75	0.14	0.98	0.15	0.16	0.68	0.24

Note. **p<.01; *p<.05; TR=Teacher-Reported; PR=Parent-Reported; WJ=Woodcock Johnson; N(Social-Emotional)=508; N(Cognitive)=445; Covariates were included in analyses, but are not presented

Figure 1. Pathways by which Chaos Influences Children's Early Development across Context

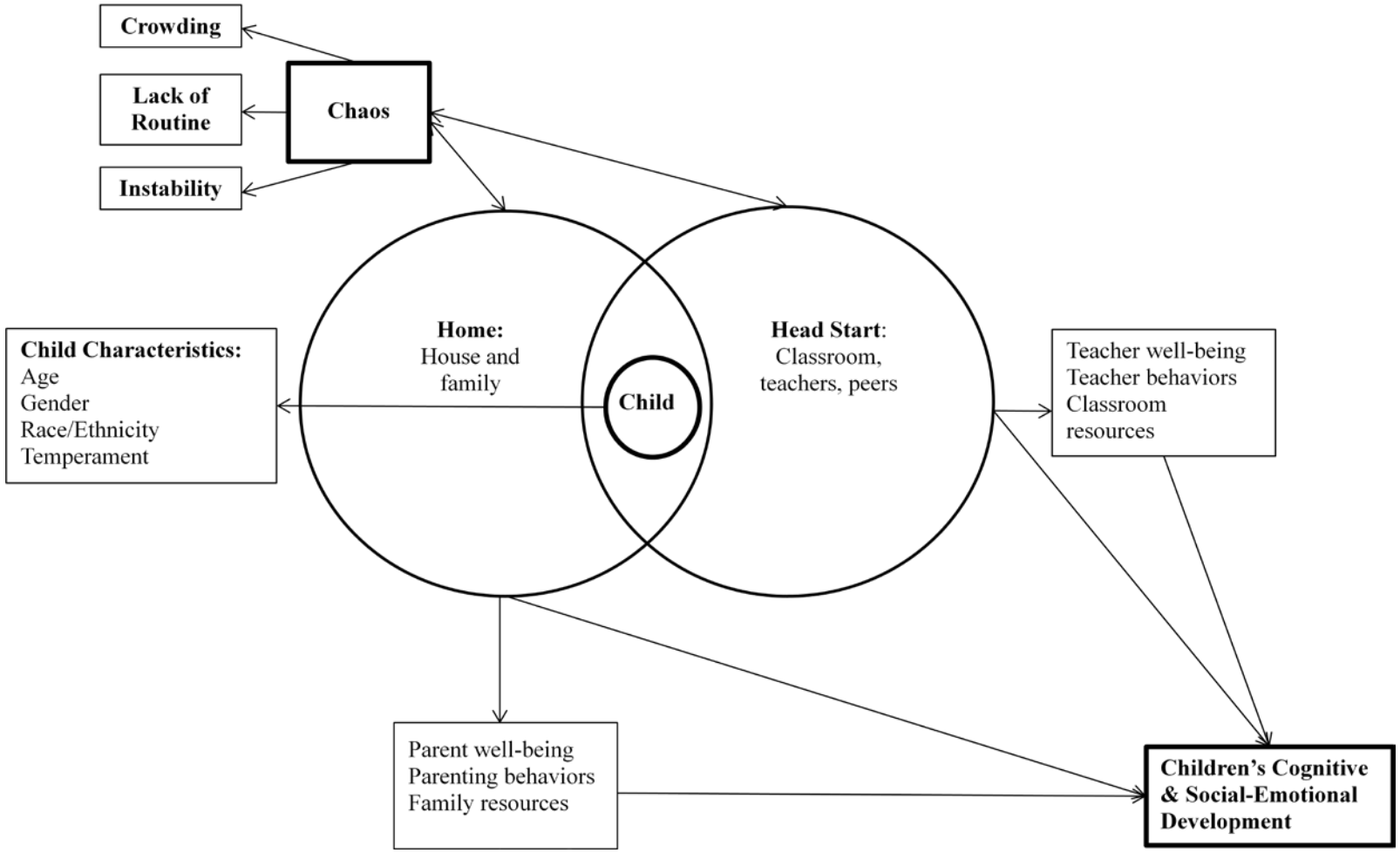
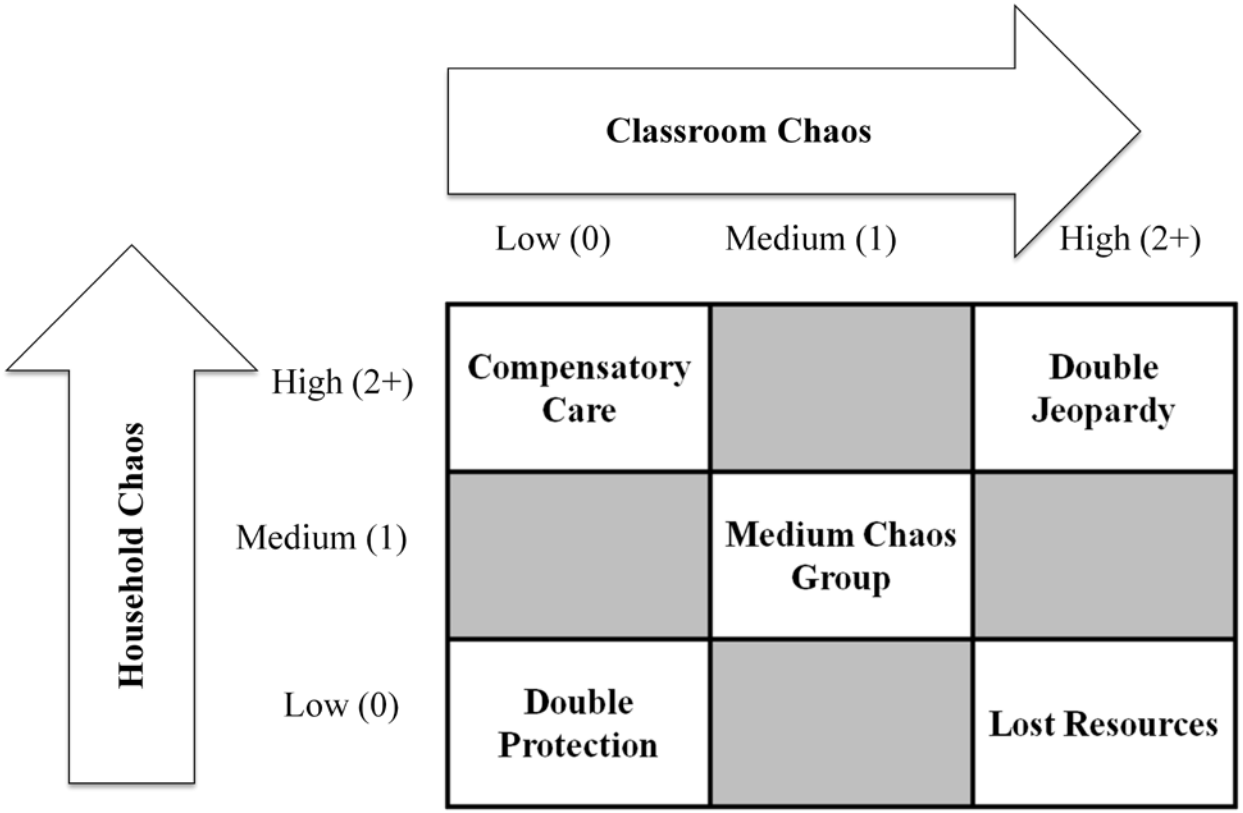


Figure 2. Children's Exposure to Chaos across Settings



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